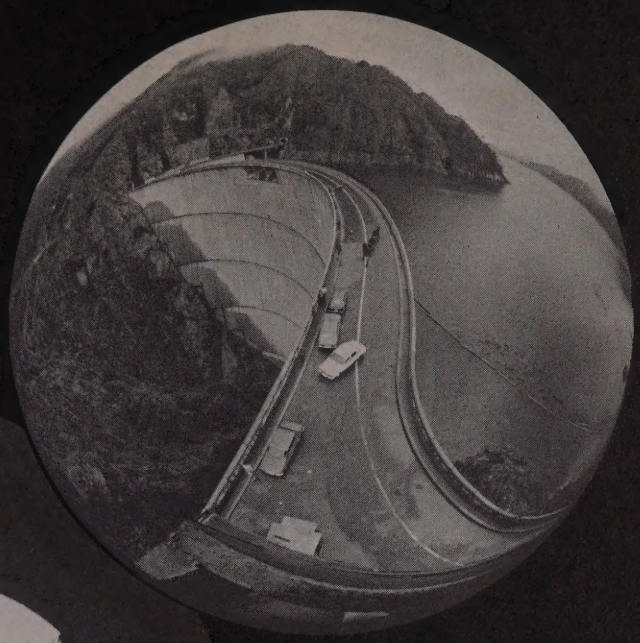

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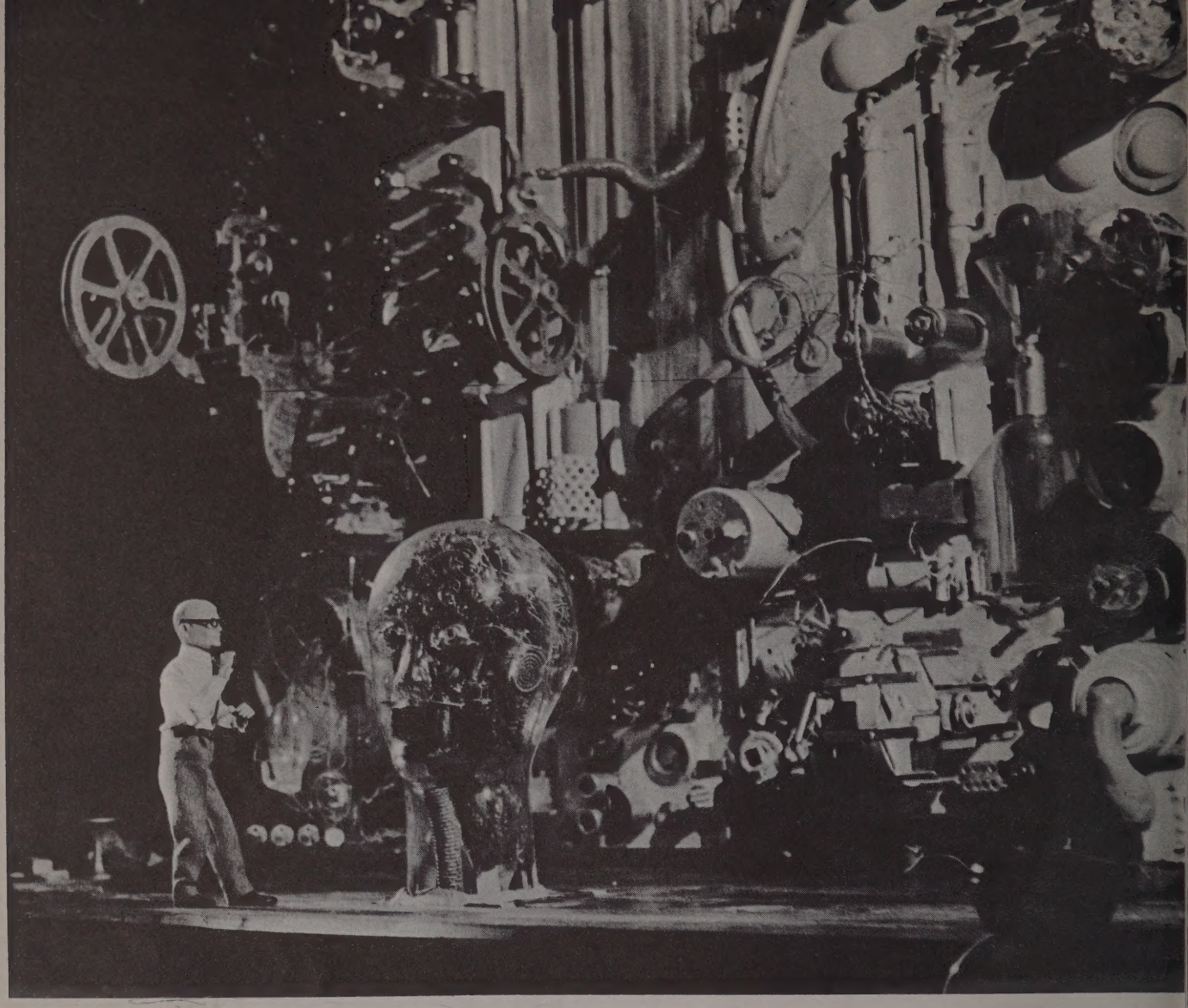


# anticipation

**No. 18**
**August, 1974**


## CHRISTIAN SOCIAL THOUGHT IN FUTURE PERSPECTIVE

These papers are circulated for the information of participants in the ecumenical enquiry o "The Future of Man and Society in a World of Science-Based Technology". Comments are welcome Church and Society, World Council of Churches, 150 route de Ferney, 1211 Geneva 20, Switzerlan

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# EDITORIAL NOTE

This is a special issue of *Anticipation*. It tries to give a short account of the World Conference on *Science and Technology for Human Development* in Bucharest, Romania, and features a selection of the plenary presentations. The Report of the findings of the Conference and a collection of all Conference papers and presentations will be available later this year. The introductory article is meant to give a brief survey of the dynamics and objectives of this meeting and a preliminary evaluation of the outcome of the Conference.

The following papers are with one exception addresses which have been given to plenary sessions of the gathering. The broad scope of their themes is characteristic of the complexity of the issues the Conference had to tackle and to deal with.

- Prof. André Dumas, Professor of Theology and Social Ethics in Paris, France, explored new approaches to creation from a theological perspective.
- Prof. E. Mveng sj., Professor of History from the University of Yaoundé, Cameroon, pointed out the challenge of cultural values to technology.
- Jun Ui, Research Fellow in the Department of Urban Engineering of the University of Tokyo, Japan, described his efforts to achieve people's involvement in the struggle against pollution in Japan.
- Prof. Georg Borgstrom, Professor of Agricultural Economics and Geography, Michigan State University, U.S.A., spelt out the dramatic urgency in the world food situation.
- Prof. Samuel L. Parmar, Professor of Economics from the Allahabad University, India, and chairman of the Conference, evaluated the impact of the limits to growth debate on the quest for self-reliance in Africa, Asia and Latin America.
- Dr. Mircea Malitza, Minister and Counsellor to the President of the Socialist Republic of Romania, assessed the role of technology in the policies of his country.
- Prof. Warwick E. Kerr, Professor of Genetics at the University of São Paulo, Brazil, traced specific phenomena of ecological destruction in the rapid economic growth of his country.

We are especially grateful for the contribution of our colleague John Taylor from the Department of Communication to this issue of *Anticipation*. His photographs of the meeting and its setting provide visual evidence of the vital encounters in Bucharest.

*Paul Abrecht*
*Peter Scherhans*

# AN ECUMENICAL VISION OF THE FUTURE

*Paul Abrecht*

As a result of the Conference on Science and Technology for Human Development, held in Bucharest, Romania, June 24 - July 2, 1974, we begin to perceive with a new clarity the limits and possibilities of our technological future. This meeting, the concluding event in the five-year ecumenical inquiry on the Future of Man and Society in a World of Science-Based Technology, had as its purpose to draw together the findings of the inquiry. Like the previous events in this programme the Bucharest Conference was seeking not only the technical help of scientists and technologists but also to draw these specialists, most of them concerned Christians, into a discussion of what technological developments in the world will mean for human life, for greater justice in society, and for a relevant and meaningful interpretation of the Christian faith. We were of course constantly asking what would be the role of the churches in the new situation in which many of the accepted patterns of life, especially in the affluent world, will be radically altered.

The 130 scientists, technologists, social activists, and theologians present represented a great cross section of opinion, coming as they did from 44 countries and a wide range of disciplines. While an effort was made to maintain continuity with earlier stages of the study, because all technological disciplines are in such dynamic movement, and new factors are emerging which have to be taken into account to get an overall view of the future as it takes shape, the meeting in Bucharest brought up new and unexpected problems which had not previously emerged in our discussions. Indeed one of the findings of this five-year study is that the World Council of Churches, and many of its members, some of which have still to give their concentrated attention to these issues, have only begun to see the whole meaning for them of the enormous changes which are in store for the world. These appear to confound all earlier prognosis and to call in question all of the carefully thought out economic and social programmes which it was previously hoped would cure the ills of the world. Thus the Bucharest Conference pointed to radically new dimensions for ecumenical social thought and action.

## I. The Ecological and Economic Configuration of the World of the Future

Perhaps the key to the discussions of Bucharest was the bringing together of the representatives of two points of view: those who see the problem of the future only or primarily in terms of achieving greater economic and social justice, and those who see it only or primarily in terms of human survival because of the exhaustion of foreseeable natural resources and the widespread destruction of the world's environment due to ever increasing industrialization. While these two perspectives are not necessarily mutually exclusive they have tended to appear in opposition. The opportunity which the Conference provided for the

different adherents to confront each other and hear each other out was perhaps its most signal contribution. Previously their mutual suspicions have frustrated any common efforts by people who after all have many of the same concerns and objectives, and who should be allies in the search for solutions.

We cannot say that all conflicts were resolved at Bucharest. Substantial differences of opinion and approach remain.

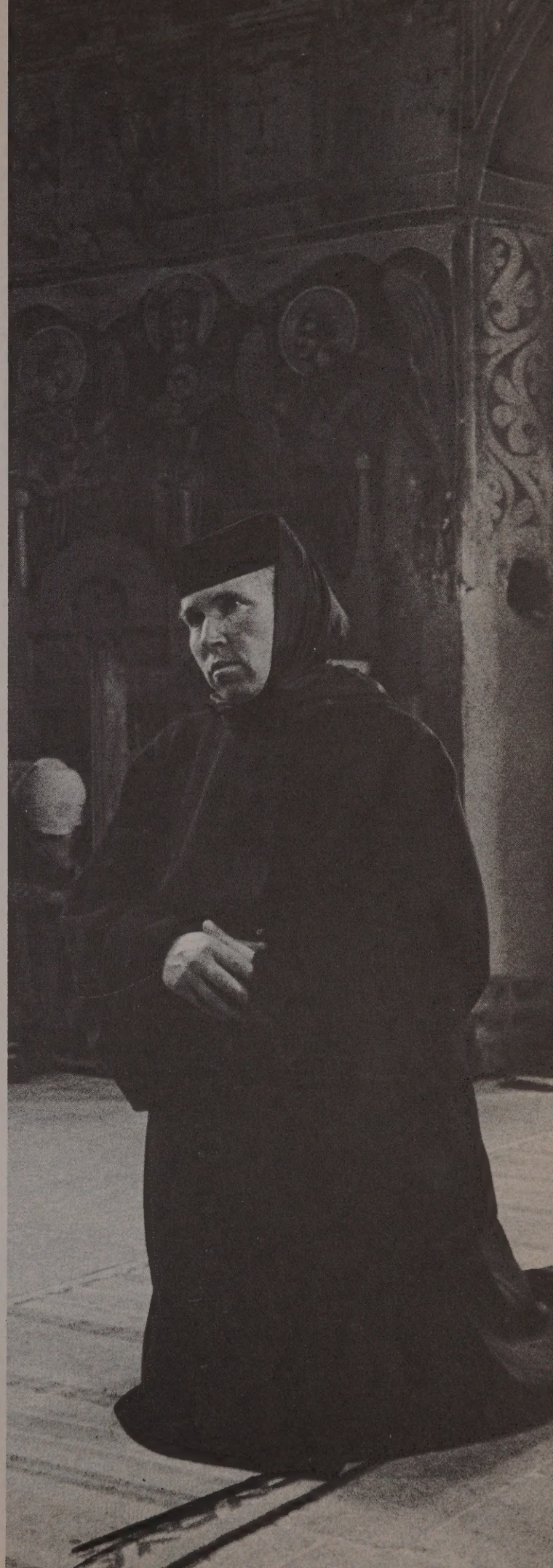
These came out most clearly in the examination of the pressure of population and natural limits to growth on the hopes of man for social justice and material progress. Previous discussions of the energy and resource problems facing the future, notably in the ecumenical Consultation in Cardiff in 1972, had clearly affirmed the need to accept a radical new approach to the technical future:

> *"In spite of this uncertainty about the position of resource constraints there is general consensus that we have entered the transitional period during which decisions must be taken and implemented concerning a major redirection of our technology, particularly that relating to resource consumption. The length of the transition period is uncertain, but the main change of direction ought to be accomplished within the next hundred years. Due to the inevitable delays in technological and social adaptation, the initiation of this process should be begun now."*

The Bucharest Conference went considerably beyond this in developing the concept of the *Sustainable Society,* based on the evident need to see the world's economic possibilities and its material requirements in some kind of equilibrium. The report on this concept recognized that this would mean different things for different parts of the world:

> *"... The day will arrive when more material production and the benefits reaped by an increasing number of people are no longer allowed to outweigh the negative effects of this growth on the other dimensions of the quality of life. Since many of the negative effects appear only after a lengthy delays, judgement as to the point at which further growth reduces the quality of life depends on the planning horizon of the judges. Feeling a responsibility at least for our grandchildren, and sensing an incapacity of the physical environment to support for long a load significantly higher than today's, we believe that the rich segments of the world have now reached a stage where their continued material expansion will reduce the quality of life for some people at some time within the period of concern to us. The remaining, poorer, members of mankind are at a stage where the current benefits of material expansion, except in terms of population, are far larger than the probable costs in terms of reduced quality of life now or in the relevant future. Thus the overall quality of life will at the present be increased by material growth among the poor and by stabilization and possibly contraction among the rich."*

For some, especially those from Africa, Asia and Latin America, the idea of the sustainable society suggested a too static and mechanistic approach to social problems and the future. But those who defended the concept emphasized that in the global village of the future, humanity could not live indefinitely beyond its means, and the extent of these means, had in the past been regarded as practically unlimited, assuming the continuing technological ingenuity of mankind. This uncertainty about the ability of world society to achieve a desirable state of economic security for



all its people in the future was highlighted by the discussion of the growing use of nuclear energy, and the possible greater use in the future. The Conference was generally agreed that the interim period, before the inevitable exhaustion of the fossil fuels, should be used to find alternative sources of energy. But the Conference was deeply divided on the extent to which the emphasis in the future should be put on nuclear power. At this point there was a tendency for a realignment of forces: in opposition to nuclear development were some scientists and others, mainly from the developed countries, who saw a great danger to people and the environment from radioactive poisoning, whose actual nature and extent are, in their view, still only slightly perceived. Supporting nuclear development were those, mainly engineers and those seeking economic growth in the poorer nations, who were reasonably confident that the dangers could be overcome and who did not want to sacrifice economic welfare for millions in the future because of what appeared to them to be the rather remote threat of nuclear pollution. The Conference did not get beyond this impasse. The Report declares:

> *"It remains an open question whether the widespread proliferation of nuclear power plants is a desirable choice for society to make. Yet throughout the Western world there are already clear signs of a growing dependence on this form of energy production. Since national energy policies are prepared in isolation it is doubtful that the collective international impact of these rapidly expanding construction programmes has been systematically assessed."*

One of the recommendations of the Conference is that the World Council should take up the consideration of the ethical and social implications of further worldwide nuclear energy development. It is particularly important for the churches to look at the human implications of this particular issue at the moment when it is becoming a critical question for many countries of the world and when the United Nations itself seems to be unable to debate openly the larger human considerations at stake.

## II. Paradox in the Search for Radical Structural Change

But if the Conference could not entirely resolve its differences about the right technological goal for the future, it managed to be more unanimous about the need for radical structural change in society, which all agreed would be necessary whether to achieve a socially just or an ecologically and technologically sustainable society. And it was agreed that basic to this search for a new society was a new non-material understanding of quality of life.

The Conference wrestled at length however with the paradox of how to realize structural change in a world already so vastly committed to highest possible standards of life.

The problem was to agree on some immediate steps by which to reduce the dependency of the developing countries on the rich countries, and the need to reorient the economies of the developing countries to make them less dependent on the world markets. There is in the reports a considerable exposition of the implications of self-reliance in terms of technology, and in the need of the poorer countries to encourage alternative life styles in the future.

And all were agreed also that the major ethical and social challenge is to the rich countries. Can they find new ways of sharing their technological know-how and what it produces with the poor countries? Can they reduce their waste of resources and their addiction to the ideology of consumerism? Can they also begin to understand that social justice seen in world dimension will involve a serious reexamination of their use of such a large amount of the world's resources, and its resulting environmental destructiveness?

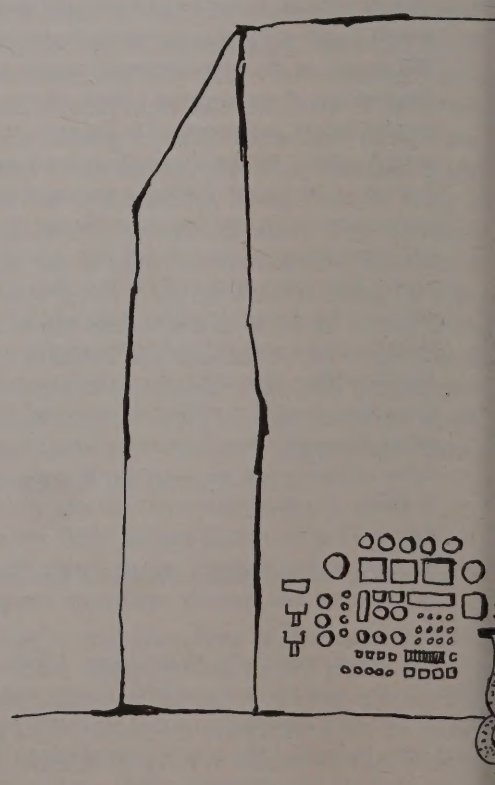
One problem is that all rich, developed countries, both capitalist or socialist, have been committed to the goal of material progress. There is no ideological system which can be turned to for guidance which has not been corrupted by the expectations of steadily advancing material welfare; committed to this goal for its own people, at the expense if necessary of other nations. The Conference was only able to make some very modest suggestions leading to a world approach to these problems which would go beyond conventional national solutions.

## III. Theological Encounters at Bucharest

The main theological discussion in the five-year inquiry grew out of the accusation that Christian theology was responsible for the human exploitation of nature that produced the ecological crisis.

At Bucharest a special theological Working Group concentrated on three issues central to the theme of the Conference: 1. The Christian hope in relation to the perplexities of the technological future, 2. The Christian doctrine of creation and human attitudes towards nature in the light of the ecological crisis, and 3. The Christian concern for quality of life and social justice for all people.

In relation to these issues the group faced the enormous task of reflecting and measuring the contribution of many different theological perspectives:



Contemporary versions of biblical theology are reflected especially in the book *Ecology and Human Liberation,* by Prof. Thomas Derr.

Prof. Lynn White's advocacy of Franciscan Christianity.

The process theologies represented by scientists like Charles Birch and some American theologian-ecologists like Prof. John Cobb.

The mystical Hellenic-Hebraic theology of Father Paul Verghese who conducted the bible studies of the Conference.

The writing of Prof. Langdon Gilkey on fate and responsible freedom.

The theologies of hope that relate Christian eschatology to Marxist ideas of history.

The liberation theologies of Latin America and the black theologies of North America.

African theologies with their emphases on imaginative stories rather than systematic exposition (represented in the Conference in the paper by Prof. E. Mveng, Cameroon, on Cultural Values and the Future of Technology).

All these theologies did, in fact, influence the discussion. But perhaps the debates of this group were most influenced by the presence of a considerable number of Eastern Orthodox Christians, who strongly advocated a classical Eastern Orthodox theology as a resource for thinking about contemporary social and ecological issues. The chairman of this section reported thus on the encounter within the group:

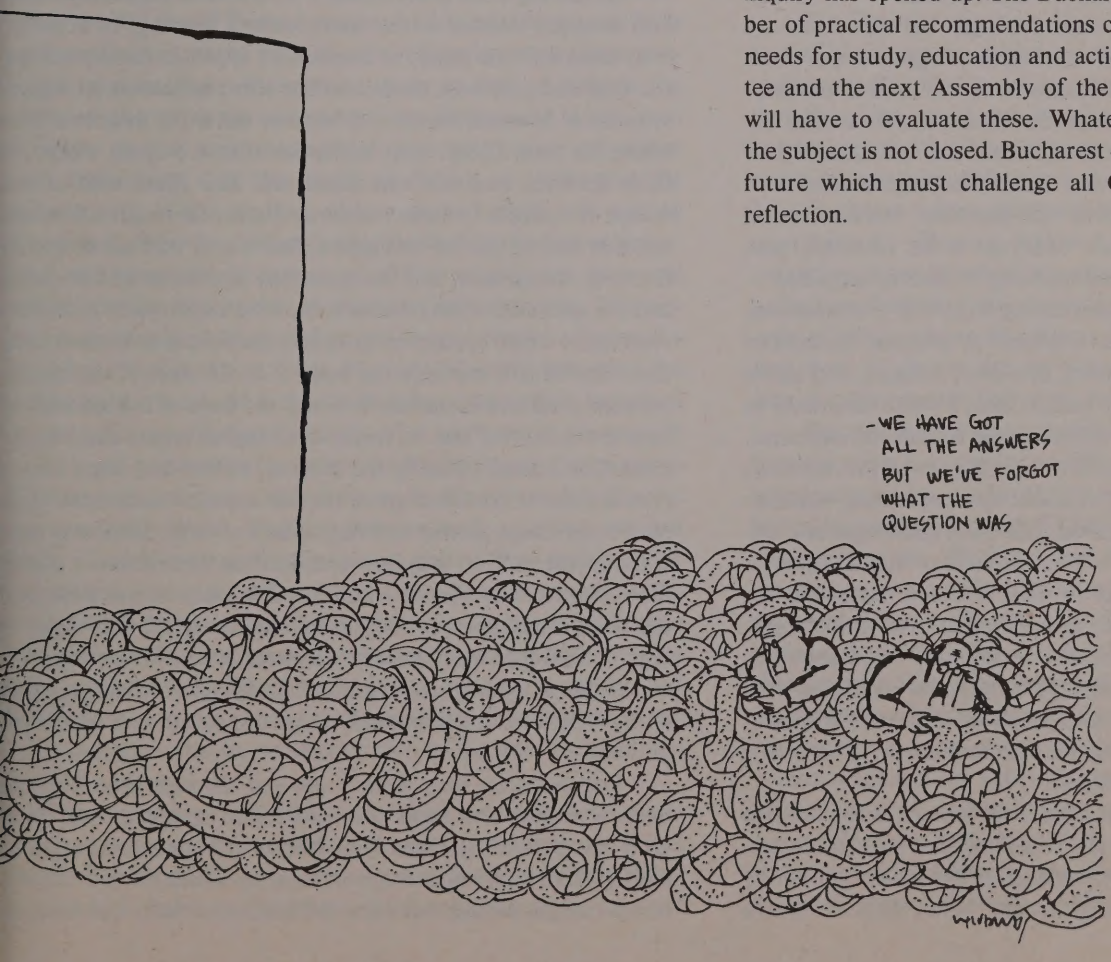
> *"Most of those present, though familiar with many sorts of ecumenical dialogues, were not very experienced in theological dialogue between Eastern Orthodoxy and more Western styles of theology. And all were discussing contemporary issues that theology was scarcely considering at all ten years ago. This double novelty of the conversations meant that they were an experimental beginning."*

Nevertheless, one passage of their report, redefining the Christian approach to social justice and quality of life, sums up very eloquently the dialectic of independence and interdependence that the Conference discovered, in trying to relate the Christian concern to the social *and* the physical environment:

> *"Justice means awareness of the authentic interdependence of people and of people with their natural environment. Independence, in the sense of liberation from oppression of others, is a requirement of justice. But independence, in the sense of isolation from the human community, is neither possible nor just. We – human persons – need each other within communities. We – human communities – need each other within the community of mankind. We – mankind – need nature within the community of creation. We – the creation – need God, our Creator and re-Creator.*
>
> *Mankind faces the urgent task of devising social mechanisms and political structures that encourage genuine interdependence, in order to replace mechanisms and structures that sustain domination and subservience."*

* * * * *

It is too early to decide how the World Council of Churches should continue to pursue the discussion of the interrelationship between faith, science, technology and society which the whole inquiry has opened up. The Bucharest Conference made a number of practical recommendations concerning the urgent further needs for study, education and action, and the Central Committee and the next Assembly of the World Council of Churches will have to evaluate these. Whatever may be decided, clearly the subject is not closed. Bucharest opened up a new vision of the future which must challenge all Christians to serious further reflection.



# NEW APPROACHES TO CREATION

*André Dumas*

Theology lives in correlation with the questions posed by the evolution of societies and their cultures. That is why the emphases of theology change with the prevailing human preoccupations. It is important nevertheless that theology not be a pure reflection of these evolutions. We could not have anything to do with a theology in which man listened to God through an ideology in which, even if it was a Christian one, man tried to say to God that which accorded with his human aspirations or anxieties. If the evolution of social and cultural problems determines in this way the locus or the place of the theological quest, its contents belong, today as yesterday, to the word of revelation, of communication, of benediction and of commandment which is God for us.

Let us attempt our reflection on the doctrine of creation in correlation with the problems with which humanity has recently become aware: the dangers of an indefinite growth of production and consumption; responsibility for the control of life and death; social research in which true community is prized over growth; sketching out of a fruitful dialogue between science, politics and faith.

## I. History of Man and Natural Environment

We have lived, until just recently, under the sign of history to which Hegel and then Marx attached such a great importance. History for modern man had ceased to be the cyclical development of empires followed by decadence that it was for man of ancient times. Nor was it the field of chance and tumultuous passion that it was for classical man. History became at once both universal and rational, collective and scientific. Mankind could decipher and establish its laws. Mankind could calculate, plan and wish for his future. A total meaning of history unfolded.

Two consequences appeared clearly from this predominance of history. *First,* the future was a symbol of promise. Because of the progress of scientific reasoning, economic mastery, and above all economic justice, humanity would come without hindrance to a stage of collective liberation favourable to human development. The obstacles were to be found in the persistence of the remnants of the past, obscurantism, individualist egoism, archaic nationalisms. In itself the future contained enormous challenges and difficulties but rightly speaking, neither menaces or limits. *Secondly,* nature seemed totally subject to man, it could, following the image of man, be historicized, technologized, and artificialized. Nature was a reservoir of resource indefinitely disposable. Nature would humanize itself also in an unlimitedly promising way; it could transform and adapt itself to all the collective wishes of humanity. Nature was no longer a true resistant in view of the conquest of its history by humanity.

We must ask if we do not experience today a radical change of perspective and whether many reasons do not lead all the peoples and all men of our time to rediscover the wisdom of nature alongside of the drunkenness of history. What leads us to this change of perspective? First of all, evidently the perception of the future as being again filled with menaces: the menace of the use of science for destructive and not only for productive and creative uses; the menace of abusive exploitation of a limited earth by an unlimited human species; the menace of a growth without justice, or community; and above all the menace of an empty future if man would lose in a purely functional conformism all that which gave savour to his history: roots and convictions, traditions and identity, cultures and differences.

We are at a moment when nature recovers a considerable importance. We live not only apart from nature, above it and against it. But we live thanks to it, in the middle of it. We must make history and also "cultivate and protect the environment" (Genesis 1:15). Up to now I have preferred the philosophical and scientific word, nature, to the theological and spiritual word, creation. We can only speak of creation in the context of faith in God the creator (Hebrews 11:3). Nature is not directly creation, since, according to the Bible, nature is an ambiguous and changing phenomenon while creation is a knowledge and an exhortation. It is necessary to be careful not to speak as if nature of itself teaches us the will of God, or of a doctrine of creation interpreting it as an immutable given or even as providential evolution.

Assuming these precautions, it is clear that the present situation awakens interest in the churches in a theology of creation. We rediscover that the Bible contains an appeal to history (the patriarchal and prophetic traditions) but also a reflection on the environment (wisdom literature). Man in the Bible lives in a time where his faith fights, acts, waits, but also in a space where his faith discerns, respects and discovers. The Bible tells of the march of a people in history beyond fatalism, through sufferings, towards liberty, justice and peace. But it also tells about the reflections, the praises, and the questions of man amidst the stars and the animals; of the cosmos and of the countryside in this environment which appears as unfathomable chaos or blessed creation. The Bible is not only the book of an alliance, of the history between God and humanity. It is also the book of the situation of man in the heart of the universe, receiving his breath and his soul from God himself. Clearly the alliance, history and man, have a central place in the theology of the old and new testament. Only man is the image partner and respondant of God. Since only man is faith, just as God only is word. But the environment of this faith and this word holds a considerable place in the Bible and this place is described as being at the same time the responsibility and the consequence of history which leads man. Thus nature, in philosophical language, or creation, in theological language, exists on the side of man and not only at his disposition and dependent on him.

For example, man lives in sin and through grace. Nature lives by threats and sighs (Romans 8:22). Man is cut off from God and is reconciled with him. Nature is troubled and awaits a kind of eschatological and cosmic security (Isaiah 65:25). There is hence companionship between the history of man and the nat-

ural environment which an exclusive predominance of historical and technological actions has made us forget. This is contrary to what the bible says about the correlation between the creature and the creation, which together, according to the bicml recitals, constitute what God has blessed. We can not therefore practice either a solitary anthropocentrism in which history abolishes nature, nor a mystical naturalism in which the act of listening to God is confused with the respect for nature and for life. We must find again a companionship of man with animals and with the elements which our drunkenness with the progress of history made us forget for a time, but which now the experience of reality of our limits made us rediscover. We must nevertheless take the word limits not in the sense of forbidden knowledge but of just acknowledgements. Nothing is forbidden by God for man to know, but God wishes in his compassion that man might live with the environment which He has given and entrusted to him. God is not jealous of the science of man, as in the Promethean myth, but God is anxious that man should not destroy his brother as in the parable of Adam and Eve and Cain and Abel. This is why the stories of creation in the Bible seem not to be explanations of the old origin but rather exhortations for present-day companionship; a companionship with the elements of the cosmos which are essentially contained in the sacerdotal tradition of Genesis 1; a companionship with the nearness of a love for work essentially shown and magnificently expressed in Genesis 2. What was the reason for these stories of creation which appeared so late in the biblical literature?

## II. The Meaning of Polemics and Witness in the Biblical Stories of Creation

As we have already said the theological word finds its place in the human question. Israel freed by the event and celebration of the exodus out of Egypt from the fatality of history now finds itself confronted, at the time of exile in Babylon, with the cosmological explanations which subject men as well as gods to the welter of the elements and make them subservient to the astro divinities. It is as a polemic against these myths, but still within their framework, that the first story (which in reality was the most recent) of the creation of heaven and earth was written (Genesis 1). Here the elements will lose their *mythological* power. They will be subjected to the word of God who creates them and offered for the domination of man who will use them. The cosmos is desacralized. Here man is no longer a chance adjunct of a mythical creation. He is made the apex of creation so that the earth might cease to be a threatening chaos and might become a good or even a very good creation. Man has become answerable to God and responsible for the world. But above all God no longer represents a welter of obscure powers. He acts as the effective and sovereign Word. God has become both a person and has made Himself known. All this putting right of Babylonian myths is a polemic exercise on the part of Israel in order to explain the God of their history in relation to the other myths which explain the universe. The first story is a protestation of the faith of Israel vis-à-vis that which cannot be its God in relation to nature. The story of creation is a protestation against the sanctification of the cosmos, against the dependence of man and against the anonymity of the gods.

The second, much older, story is also a protestation against the numerous divisions which menace and of which we are all aware. The God of creation did not want division between man and woman, between the labourer and a hostile earth, between life and the power of death. For this reason, Genesis 2 asserts that Genesis 3 is the outcome of the wrong use of human freedom, and not the inevitable consequence of an immutable divine decree. The polemic here divides the creation of God from history as experienced by man. The framework is more intimate than in the great cosmic liturgy of Genesis 1. But the polemical intention remains very similar: to start with, (that is to say here and now) God does not want the things man brings into the world: in Genesis 1 – confusion; in Genesis 2 and 3 – solitude.

We touch here the content which bears witness to these stories of creation inasfar as their polemical connection is concerned. They bear witness to two main things: first of all that God wanted a good world, i.e. that all evil (ontological, logical, social and ethical) should be fought against. Nature is only history governed by inevitability. Secondly, that the worst company for each person is his own solitude, whether it springs from envy or fear, pride or doubt, the dream of something better or the discouragement about the worst. "It is not good for man to be alone" (Genesis 2:18) – this is the main witness in the second story of creation, as also "God saw all that he had made and behold, it was very good" (Genesis 1:31) is the main witness of the first story.

But did Christian tradition pay due heed to this polemic meaning and witness of the story of creation?

## III. Philosophical and pseudo-scientific meanings of the doctrine of creation in Christian tradition.

We should not protest in vain against the doctrines transmitted to us from past centuries. Each century had its own polemics and necessary witness depending on the circumstances in which Christian faith had to exist. However, we are entitled to ask whether we need to repeat them in the same form nowadays where circumstances are so different.

The Christian doctrine of creation has fought against the notion of demiurge by asserting creation *ex nihilo*. It has fought against the divinization of the cosmos by refusing the notion of eternity of the world and therefore by dating the creation in accordance with the biblical stories. It has more or less placed the origin of time from before and after the fall. It has tried to show how God was in immediate and personal contact with each human being by affirming that at a certain moment each directly created soul was breathed into a human body. It was mainly tried to find out how God was the principle cause of all the secondary ones of which we see the effects. God has thus become the primal cause of what is, and the biblical stories are only the description of what preceded all other things.

But modern science and philosophy have made the comprehension of such explanations difficult. We know what infinity of time preceded our own evolution, even if the most recent cosmological hypotheses agree that 12 billion years ago there was an explosion of matter. We know that breath (life) comes with the increasing autonomy of the body and we no longer know where to situate the intervention of God, if He is understood to be the cause and not the creator. If we thus put together the notion of creation with that of the origin of things, we are liable to make God withdraw into the silence of untouchable phenomena and to take away the sense of exhortation and of belief in creation. In picture language, one could say that if we look for God at the beginning (Anfang in German), then we place him at the level of the origin (Ursprung in German), we would confuse the plan of the science of phenomena where one studies processes, with that of belief where one listens to the meaningful word. By putting

together these notions, we are likely to confuse the choice of the faith, to use the Bible in competition with science and above all to lose the sense of the theology of creation, at the very moment where our generation wants this more than ever, as we have seen.

**IV. From the origin of the world to conviviality**

When I use the word conviviality, made fashionable by Ivan Illich, I mean to suggest that we should see the stories and the witness of the creation of the world by God not as a supernatural explanation of the processes of its origin but a theological exhortation for its blessed use. God has given the world in trust to human sciences and wisdom so that man might continue the struggle, the separation between light and darkness, livable and unlivable, of which our faith testifies that God is the eternal instigator. God has given the whole earth to all men so that they might find their food, work, pleasure and love. Humanity is thus constantly urged to maintain and pursue creation, by refusing chaos and devastation. Here man alone is responsible, without alibis or prohibitions. But man is only the guardian of this nature and lives from it in the belief that God is its creator. The belief in creation, that is to say in its essential goodness, goes beyond what we can experience through the phenomena and the use of nature. It is the belief in creation which will lead us to study and use nature without becoming discouraged. Belief does not object to or mistrust science though it does not see salvation only in the natural sciences; it gives man the courage to continue to struggle ceaselessly against all that destroys the goodness of creation.

At this moment we must pose the question at the following levels: Should we change from the devastation of uncontrolled growth to an equilibrium between demography, resources and consumption? Should we change from a struggle for the quantity of life to one for quality? Should the struggle be left to the conscience of aware individuals or imposed by general restrictions? Although the churches know the reality of sin and believe in the reality of grace, can they show us here patterns of life and society? In all this, the doctrine of creation ceases to appear like an archaic and obscure supposition and becomes once more a precise and living exhortation. The new creation in Jesus Christ (Colossians 1:15) is an affirmation which has important political and personal consequences. Then Jesus Christ is the saviour of the world because he is its perpetual creation, together with His Father and the Holy Ghost (1 John 1:15).

# CULTURAL VALUES AND THE FUTURE OF TECHNOLOGY

*E. Mveng*

Science discovers and codifies the laws of nature. Technology uses these laws for industrial purposes in order that man may have greater command over nature and be able to satisfy his needs.

When we in Africa speak of culture, we mean the treasures of humanism gathered by our people: they provide a link with the past, sustain them in the present and carry them forward into the future. These values are therefore the permanent expression through the history of a people of the victory of life over death.

In order to appreciate what cultural values mean for us in Africa, it will be useful to recall the main features of fundamental negro-African anthropology which, as you know, is an integral part of our cosmology.

In my book *L'Art d'Afrique Noire, liturgie cosmique et langage religieux* (The Art of Black Africa. Cosmic Liturgy and Religious Language), (1st Edit. Paris, Mame, 1964, 2nd Edit. Yaoundé, CLE, 1974), I showed clearly and precisely the main features of this anthropology and cosmology. It would probably be better to speak here of *anthropo-cosmology,* or even to use only one of these terms as each one comprises the real susbstance of the other.

In the negro-African tradition, *man* basically represents *life.* This life is a creative power which surrounds the cosmos and constitutes its body, its organs, the abundance of the elements. *Man* and the *cosmos* are linked by a necessary complementarity: Without *man,* the *cosmos* is nothing but *man* is nothing either without his cosmic context. Thus from that moment on there is no incompatibility:

*Soul* - *Body*
*Spirit* - *Matter*
*Nature* - *Supernatural*
*Individual* - *Society*
*Subject* - *Object* ... etc.

There is only the necessary complementarity, and each word requires the other so that its own meaning can become clear.

Therefore, the bond between *man* and the *world* is by definition organic. The body of man begins with his own organs but is extended indefinitely through all the elements of the cosmos: "My little finger stops there where the last of the stars stops". Man, every man, is the heart and soul of the World: he is its conscience, its voice and utters its cry before God.

The unity between *man* and the *cosmos* is not a simple unity: We do not advocate an elementary and naïve pancosmism, and even less a generalized materialism or idealism. We have here a dialectic unity made up of two realities which complement one another. This unity can only be dialectic because each of the words is itself complex and dialectic in its deepest meaning. The words are only complementary because each necessarily needs the other - why? Is it because otherwise each one without the other is damned? It is for this reason that the cosmos and man are constantly in danger of perdition and need one another.

But why are man and the world in danger of perdition? Because in their very nature they are attacked, divided and wounded. They are their own enemies.

If *man's* being is *life,* then the enemy of this being is *death.*

If the world is the extension of *man,* its being is also *life,* and *death* its enemy.

Here we must emphasize that the specificity of *man's* being in history does not consist of two autonomous realities – on the one hand *life* and the other *death.* No – it arises from the confrontation, Hic and Nunc, of *life* and *death.* It is this which shapes the destiny of *man* and makes him into an historic being: the fulfilment of this destiny is victory – the victory of *life* over *death.*

The reason why the world can be both destiny and history is because it takes part in the drama which divides man and in the confrontation between *life* and *death.* For the world also the fulfilment of history is *victory – victory* of *life* over *death.*

This doctrine is the universal basis of religion, of worship, liturgy, the arts, technologies, and the political, economic and social structures of traditional African societies: it is also the basic rule of the main schools of *initiation.* It follows that *man's* only task on earth must be to prepare himself, to mobilize the whole of creation for the struggle of *life* against *death,* and to make sure of the final victory of *life* over *death.*

A careful study of African doctrines of initiation will show that all their pedagogy consists in revealing to man the book of his destiny and the book of the world, so that man might learn to recognize the face of his allies and of his enemies in the fight which will take place within him between *life* and *death.* Man must be taught to mobilize all his allies for the final assault which will lead to victory of life over death.

**Mythical or Scientific Mentality?**

Western ethnologists quickly came to the conclusion that the people of Africa had a purely mythical mentality. If this were true, the foregoing remarks would not have fitted into a debate like ours. On the contrary, facts have shown that in Africa what is known as a scientific mentality on the one hand and a mythical mentality on the other really constitute two dialectic parts of one and the same reality. In the research which I have been carrying out for years, I have always seen that in African tradition the process of perception of reality and creative action is the same in all spheres.

This process, shown schematically, is divided into four steps. The first is one of *concrete experience,* as it is in Western science. The second is one of *abstraction* or of *selection:* in art, I call this step the *essential line.* The third step is the creation of *symbols,* i.e. a vocabulary of creativity. And the last step recreates the cosmos in the image of man.

One can obviously enlarge on each step of this process, and one can also reduce it to the following two extremes: the starting point is concrete experience and leads finally to creation.

Let us take some examples –

In art, this process takes place in four stages O – L – M – C.

O is the concrete experience of the object in its natural state;

L is the essential line, in other words the point of abstraction or selection;

M is the creation of motifs and symbols which are the language of creativity;

C is the moment of creativity, when the artist uses the raw materials which he finds in these symbols and recreates the cosmos as he sees it.

I have used this process to analyse traditional African arts and the result has always been conclusive.

Let us take another example, this time from the natural sciences. I have examined two traditional sources – figurative art and verbal literature.

The study of the Abbia motifs – miniatures sculpted on nutshells from Adjab, which were used as counters for a traditional game – has shown that they constitute a true handbook of natural sciences.

The fauna is represented by 64 known and catalogued species. There are 43 species of birds, 23 species of fish and 27 species of insects. I investigated what verbal literature had to say about the same themes. A blind man whom I consulted was able to enumerate from memory a list of

83 species of birds
46 species of fish
21 species of snakes
59 species of insects
27 species of cultivated plants
55 species of wild plants
117 species of vegetables
55 species of wild animals... etc.

Each species was described in astonishingly precise detail. Here we have an objective knowledge of nature which is in no way mythical.

But my informant also had a different kind of knowledge which we might call symbolical: it included the function and significance of each species in the context of the life of man. This knowledge in no way invalidated his first description but was based on it; it showed, in the way nature was being utilized, a form of *technology* for changing nature in the service of man in a number of ways:

- nutritional: traditional technology shows us how to transform fauna and flora into food;
- therapeutic: here technology shows us the traditional pharmacopoeia;
- liturgical: technology is used to transform the elements of nature into elements of rite and into ornaments of liturgy;
- sapiential: traditional technology changes nature into a book of wisdom from which man may learn how to behave so that he will overcome death and ensure the triumph of life.

Here we have the twofold task of *cultural values* and *technology.*

In Africa, *culture* teaches man to decipher the book of his destiny and the book of the cosmos. There he can find the names of his allies and of his foes in the battle of life against death. *Technology* allows him to muster his allies in the face of the enemy, to mobilize himself and the universe in the battle of life against death.

You will have guessed why we in Africa are so optimistic and so keen on technology. You will have noticed often that, while the West regrets the dangers of a dehumanizing technology, the Africans call loudly for the coming of the technological era on their continent, although they do not of course belittle the dangers. You must not think that this is the innocence of a child wanting to kiss snakes or pick the stars out of curiosity about the unknown or the unusual. The truth is that in our understanding of the world technology is there to help man control the powers of death which are hidden in the world, so that life may become liberated. This is only possible if science and technology can look at the world with the eyes of *culture,* with eyes that know and can read in the faces of things the names of life and death.

Unfortunately the experiences made by modern Western technology seem to deny these premises. For modern man, the control of the atom does not mean in the first place the freeing of isotopes for the improvement of agriculture, medicine or means of transport, but rather it means military force, the destruction of

Hiroshima and nuclear terror. It divides the world into blocs based on destructive capacity. Technology in this case takes no notice of culture. It claims to be entirely free from the constraints of moral consideration, religion, art, poetry, and to have nothing to do with tenderness, pity, contemplation, suffering and joy. This is only possible because the science on which this technology is based is blind. It does not attempt to understand the world; it tears away the world's veils and when it sees its nakedness is struck with blindness and falls into concupiscence. Then man makes peace with his foe and flees from his ally. He takes up arms for death and fights against life.

Science and technology seem at first to stand for efficiency, domination and the possession of the world. They create new appetites and make man greedy like death. I should like to tell you here the story of *Evu-Mana,* the spirit of death, brought into the land of the living by the greed of a woman:

The story tells us that one day a woman went into the forest to go fishing. She went from stream to stream without catching anything because all had been fished already. At the end she saw some brackish water – a small lake. She stopped and just as she was bending over to start fishing she saw lying nearby a beautiful antelope which had died. The animal looked fresh and there were no marks on its body, its legs were not tied. The woman was surprised, hesitated a moment and then she said "What luck – all that meat! That is much better than a little fish". So she cut up the animal and returned to her village. She cooked a delicious meal and all her family ate well.

When this meat had been eaten, the woman went back to the small lake. How surprised she was when she again found the same kind of antelope there. She cut up the animal, returned to the village, made a meal and all her family ate of it.

The woman went back a third time to the lake and again she was lucky. She came back a fourth and a fifth time – each time there was an animal for her in the same place.

Then a strange feeling came over her and she felt afraid and worried. Was there not some mystery hidden behind this piece of luck? While she was still wondering about this she suddenly saw crouched in front of her a strange creature staring at her. Though she was trembling, she nevertheless dared to ask: "Who are you strange being? – Are you the hunter who has been killing these animals?" – "Yes, I am," replied a hollow voice, "it is I who have killed these animals."

So the woman said: "Since you are so generous, please come with me to the village of men". The creature replied: "I would like to, but will I find something to eat in the village of men?" "Don't worry about that", replied the woman – "there are goats, dogs, cats and fowl galore in the village of men."

"Very well, carry me and let us go", replied the creature.

The woman held out her arms as one does for a baby; Evu-Mana refused. She offered her hip and this was refused also. She offered her back and was refused. She offered to carry the creature in all the usual ways in which she normally carried things and Evu-Mana continued to refuse.

The woman was astonished and asked how he wanted to be carried. Evu-Mana replied: "Woman, please squat and let me enter there where men are born, because I am not a creature of light; I live in the shadows."

The woman squatted, Evu-Mana entered her womb, and they went off to the village of men.

They had hardly arrived in the village when the woman heard a voice calling: "Woman, I am hungry!" – The woman offered him branches of cassava but the voice refused; she offered couscous and it was also refused, as was a dish of meat. So the woman asked him: "But what kind of food do you want, strange being?" The voice replied: "I need living creatures. I devour the living – I eat only lives and not bodies!"

The woman showed him her husband's herd and day after day it became smaller. Then the dogs, cats and fowl also disappeared but Evu-Mana was still hungry and kept on calling for more to eat.

When all the animals had died, human beings – infants still at their mother's breast, small children, adolescents, men and women, the old people – were devoured. But Evu-Mana was still hungry and kept on calling for more to eat. The woman gave him her husband, her own children and the voice continued to call: "I am hungry, hungry, hungry!" ... – "I have nothing more to give you," replied the woman. "Oh yes, you have," said the voice. "As long as there is life on earth, I have something to eat. You are still alive, woman, come and I will eat you! Because I am the evil spirit – the evil spirit of death!" Even before the woman had time to cry out, Evu-Mana had devoured her.

*(Extract from a collection of unpublished stories collected by Abbé Léon Messi, Yaoundé).*

If today humanity trembles before a world of inhuman technology, it is because technology resembles Evu-Mana, the evil spirit of consumption who encourages the appetites of man and in the end devours everything and who mobilizes the powers of death in order to destroy life.

This is the crisis of our present-day civilization. It is general and spares no one, – either nations or continents. The foregoing analyses in no way try to exclude Africa from the danger; they try only to show that the crisis can be overcome when technology is based on culture.

Any careful analysis of crises in Africa shows that they all occur when the cultural foundations of life are denied. This is also true of other civilizations.

We asserted at the beginning that man is a complex being, complementary in his dimensions and dialectic in his structure and that the world resembles man. Man's task is to unite his destiny which is divided by the struggle between life and death, and in so doing, unite the whole universe. This unifying task is the struggle between life and death and is the precursor of victory, the victory of life over death.

But civilization in a state of crisis is based on division.

Modern science divides the world into autonomous sectors which are each governed by their own laws. The essential sectors, which the layman might call *metaphysical,* are put aside or abolished altogether.

Man considers himself to be the absolute master. He is the master of the world, of the laws of the world, the laws of nature and the laws of ethics. Modern science accepts not only the supremacy of man and his total independence; science also proclaims the supremacy of the world inside its frontiers.

In fact we go further. We pretend that the drama which divides man and the world does not exist. We say that when there is life, it is supreme, and when there is death, then it is supreme. Only one law rules man's choice – the gratification of his appetite.

It follows that science is bent on uncovering the world, and that the nakedness of the World stirs up concupiscence and exacerbates its appetites.

Therefore technology is based on the gratification of these appetites but unfortunately they create in us the insatiable voracity of Evu-Mana.

And this is why in traditional Africa this process leads to bloodthirsty fetishism and why today it brings rough and brutal materialism.

This is why the present-day crisis of civilization is the image of the confusion of man, victim of Evu-Mana.

Not because technology is bad or opposed to culture.

Not because culture is bad or opposed to technology, but because the necessary bond between them has been brutally cut.

The future of cultural values is truly the future of man because these values alone will allow man to be creative, the creator of his own destiny, of his history and in the real sense of the word, of technology. Only cultural values promise man immortality and without them there can be no future, not even for technology.

The present-day crisis of civilization is in fact a problem of basic choices; this is really what the story of *The Moon and the Gatherer of Palm Wine* is about.

One day God called two inhabitants of the world – the Moon and the Man – to him and said: "Go and bring me palm wine! You will find two palm trees and on these you will find two full calabashes; bring me back their contents."

The Man and the Moon each took a calabash and set off. They walked a long time before reaching the palm grove and the sun had almost set when, tired, hungry, desperately thirsty and out of breath, they saw far away God's palm trees.

They set off at once, put a hoop around their body and leapt up to the top of the palms.

The Man unhooked the calabash with the palm wine and, because he was so thirsty, started to drink deeply: the whole palm grove resounded with the sound of the calabash being drained. When he stopped, there was only a little wine at the bottom; this he poured into his own calabash and then hooked back God's calabash. Alas, there was not enough wine to fill his own and he had to bring it back almost empty.

During this time, the Moon ahd reached the top of its palm tree. Though tempted to drink, it refrained: First I must fill God's calabash. It unhooked the recipient and emptied the contents into its own calabash – it was filled to the brim. There was still more wine at the bottom of God's calabash and only then did the Moon quench its own thirst, empty the calabash and hook it back on the palm tree.

Man and Moon returned: Man's calabash was almost empty, that of the Moon full to the brim. When they reached God, Man was the first to run towards him; he held out his calabash and said: "This is all the palm wine I found on your palm tree, honoured God!" "Alas, poor Man, you gave way to your greed and now you succumb to lies: you shall eat the fruits of your actions!"

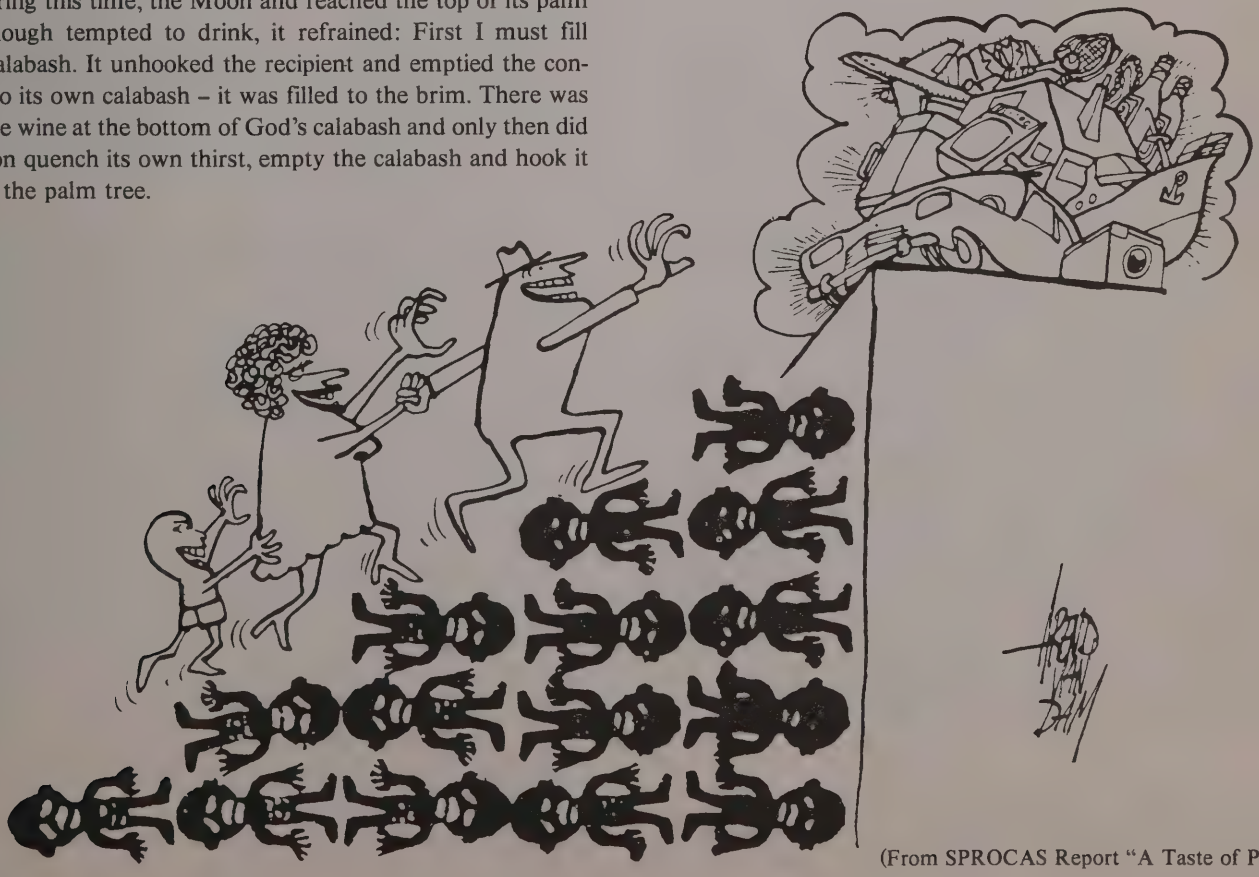
The Moon then came forward timidly. It proffered the calabash and said: "Honoured God, I have filled the calabash and, as there was some palm wine left over, I quenched my thirst!" "Very well", replied God, "you have overcome your desire and have done your duty. You shall eat of the fruits of your actions!"

Then God spoke to them both – "Return to your village. Tomorrow at sunset, your fate will be decided."

The next day at sunsed, both were found dead and the villagers mourned and carried them to the cemetery. But how astonished they were the next day when at sunset they saw the Moon rising on the horizon, looking more beautiful than ever. They ran to the tomb of the Man and thought that he also would return alive. But the tomb was still there, untouched. They started to dig and suddenly they drew back in horror: at the bottom of the tomb, there was only a hideous, putrefied body. The Man had been struck dead for ever.

Since that day, men have died and not come back to life but the moon disappears and then rises and is more beautiful than ever.

Technology without cultural values is man who dies, never to return. But technology based on culture is the unending renewal of humanity.



(From SPROCAS Report "A Taste of Power")

# HELPING SCIENCE AND TECHNOLOGY SERVE HUMAN GOALS

*Jun Ui*

## *A Case Study of the Social Implications of Pollution in Japan*

### The Reality of Japanese Pollution

There is no doubt that Japan is the most advanced country – in pollution – in the world. The magnitude of the problem is shown in the mass killing of human beings by various pollutants, such as the famous Minamata disease (mercury pollution by industrial waste), Itai-itai disease (cadmium poisoning by mining waste), and Kanemi Yusho (PCB poisoning by food contamination), as well as asthma in various places caused by industrial air pollution. Even mass poisoning by mercury and cadmium occurred more than twice in Japan for the first time in the world. This fact clearly shows that the problem is rooted in an institutional defect of Japanese politics and economics.

Pollution became evident in Japan during the 1960's. However, Japanese pollution has a long history, parallel to the process of modernization of society in the last century. There was, for instance, at the end of the nineteenth century the case of the internationally known Ashio copper mine: Waste from copper mining and arsenic were discharged into the Watarase river, and polluted downstream rice fields.

Even if Japanese economy continues to grow only at the same pace as in the past twenty years, environmental pollution will likely increase, with multi-component pollution and accumulation of bad genetic effects – to the extent that 20 – 30% of the total population will be suffering from some pollution disease within a few decades. It has become clear that many pollutants have rather accumulative effects on human health, as well as on the environment. The genetic effect of mercury and cadmium is now known to increase chromosomal alterations. Even an air pollutant such as sulphur dioxide, which was considered as a rather unstable short-life pollutant can have accumulative effects on the change of soil conditions through the acidification of rainfall. For such irreversible, accumulative change, there is no technological solution – only the removal of the cause itself.

Many factors have contributed to the heavy pollution in Japan. Some are inherent in our national conditions, some are rather common to other countries. The following factors might be common to many developing countries in the near future:

1. Increasing use of Western technology at the starting point of modernization.
2. Rapid centralization of political power at the expense of tradition and the self-governing capacity of local communities.
3. Rapid economic growth due to strong support of a centralized government, and resulting accumulation of capital. In addition, the neglect of pollution and other social problems has supported capital accumulation, which in turn enabled the high growth rate of the economy.

### Trends in Japanese Politics and Economy

During the past century, Japan imported Western capitalism and related institutions as well as economic theories. Before World War II, capitalism (combined with nationalism, militarism and expansionism) was national policy, the slogan was "strong army, rich country". The duty of everyone was to strive towards this target. Even after the War this tendency changed very little. The slogans survived, although the strong army disappeared. The economy grew effectively with the strong support of stable conservative government, which received the financial support of big industry. Everywhere in Japan we heard discussions on economics with such slogans as "first make a larger pie, then divide it", or "big capital is necessary for the rapid local development and improvement of the quality of life", etc.

As a result of this rapid economic growth, all value systems in Japan were measured by money. The traditional Japanese life style with its variety of value systems disappeared completely, and our system became very uniform. This unifying of the value systems and the destruction of traditional values reached its peak in the '60s, called the golden '60s. In fact they became the polluted '60s.

On the other hand, the gap between rich and poor widened, social injustice increased in number and variety. Most of these social problems were pushed under the carpet of society.

The expansion of industry was accompanied by the decline of agriculture and the seasonal migration of farmers. The devastation of agriculture and the destruction of farm houses are now serious social problems.

Religion played only a small role in the process of modernization and westernizing of Japan; though in fact the Christian churches helped the process in some cases.

### The Role of Science and Technology in Japan

Present Japanese science and technology resemble low-grade religion in many aspects. Japanese science followed the Western pattern for a long time and was subservient to strong public and private power. During this period it lost its originality and creativity. The most successful work was the modification and adaptation of imported technology to Japanese conditions. Japanese science and technology did not on the whole show original development except in some traditional fields such as fermentation technique.

In Japan nowadays, to be a scientist or an engineer is one of the fastest ways to enter into the established society for a poor but ambitious young man, although this way becomes more and more difficult each year as a result of the severe competition in the highly structured educational system. The situation is somewhat similar to the medieval Buddhism in Japan. Conversation in academic circles is embroidered by foreign languages such as English and German, difficult to understand for the ordinary laymen, just as it was in medieval temples with Sanscrit or Latin. The university buildings become more and more impressive and magnificent as did the medieval temples. Universities are now

equipped with computers instead of gongs and pipe organs. The whole system of science and technology in Japan serves the powerful and the strong of the present society. It cannot be useful for the happiness of the weak and poor. It can, mildly stated, be compared to demons in Arabian night tales. It was developed in a distorted world with a defective spirit. If we want to control science and technology strong will-power is needed.

**The Struggle of People's Movements Against Pollution**

The history of pollution in Japan has clearly proved that the only effective struggle against pollution has been carried out by movements of local people. A few examples of the involvement of these local movements may be given here in order to illustrate the broad variety of their character.

In the history of the Minamata Disease, the large obstacle facing the association of victims was the 1,000 km distance between the site of the factory and the head offices of the company (Chisso Co.) in Tokyo. The factory management always tried to escape from their responsibility by saying that they had no authority for decision-making without permission from the main offices in Tokyo; on the other hand the victims had no possibility to continue lengthy negotiations in Tokyo. In 1971, small groups of victims started sit-ins at the main gates of the head offices of the company in Tokyo, asking for direct negotiations with the top managers. The managers. The managers tried to avoid this, but after a year and a half of sit-ins, the company had to make some concessions. These sit-ins were supported by many anonymous, long-haired young people in Tokyo, who helped the victims and worked to continue the action. It is a remarkable fact that young people with no religious convictions helped the weak and poor in an almost religious manner, asking nothing for themselves.

One conclusion from this action is that the ownership of industry is of vital importance in the struggle against pollution. If the production of a multinational corporation is the cause of the pollution, victims can hardly find the responsible head office and personnel, and the protest movement will lose its target. If the owners of the factory are the rich and powerful people in the same country, then the issue becomes a class struggle. But if a factory is owned by a local community itself, as is the case in modern China, the issue will be settled by the people at an early stage and can be regarded as part of the issue of participation and ownership.

A mutual help organization was recently formed among Japanese families suffering from traffic accidents. One of the tasks of the organization is to collect a fellowship fund for the children of victims, to enable them to get higher education. Some of the organizations involved started to evaluate the city planning from a viewpoint of the victims of traffic accidents. With many social problems including pollution, the most concerned people are the victims themselves or the people suffering from the consequences. My assertion that true experts should be developed from among the victims is theoretically correct, but in most cases unrealistic. Most victims are unfortunately invalids and especially in pollution cases their nervous system is damaged. In fact they have little hope of educating themselves to become experts in the present society. In the case of traffic accidents to parents, the children can be helped to become truly concerned experts, and if they can help design cities which are suitable for invalids and the weak, then the town will be more livable for everyone. Here the fellowship system and efforts for safe city planning offer us future hope.

Finally, I should like to mention my own activities. To protest against the obsolete, power-oriented university education, I started in 1970 a series of public evening lectures on the problem of Japanese pollution. In the present system of my university, the most privileged school in Japan, an assistant is not authorized to inaugurate lectures. Hence in the administrative sense my action was illegal. Following our past traditional amusement performances, the audience coming to my lectures pays a small amount of money at the entrance. If someone feels that the lecture was not interesting enough or that he could not understand the content, then he can take back his money. In this way there is a mutual relation of tension and reliance between the lecturer and the audience and, in addition, the lecture is self-supporting financially. Volunteers at the lectures came forward and formed a kind of action committee to prepare various things necessary for the lecture. They also collected enough money to send victims of Japanese pollution to the U.N. Conference on Human Environment in Stockholm; we prepared the pamphlet *Polluted Japan* as the report from Japanese people. With the cooperation of many local movements, we are now collecting and distributing many kinds of information about pollution, and acting as an information network in Japan. If someone wants to known about a projected industrial plan, we refer him to those who have the most experience and information on the problem. In this way we are helping many local movements.

One of our most urgent tasks is to extend this network to the whole world, especially to Asian countries such as Korea, Thailand and Malaysia where the polluting Japanese multinational corporations are going. We are preparing the Japanese branch office of the Asian Environment Society (AES) as a channel of international cooperation. The basic principle of our movement is unconditional service to the weak and poor, the most truly concerned people in the issue of pollution.

**Conclusions**

For various reasons and factors, the Japanese political pendulum will unfortunately swing to the right for some foreseeable future, in spite of our efforts, and people's movements will still be in the minority. Much time and effort will be needed before we can get the support of a majority in Japan. Despite this, our way is clear for us: Decentralization of decision-making so that the poor and the weak can participate and benefit. In other words, the enforcement of local self-government is the most important task for us. In this, the mobilization of young people is essential because pollution is a present and future problem. If we succeed, the waste of resources and pollution will substantially diminish because there will be a decrease of the economic growth rate. For this kind of unconditional service to the weak and poor, we must learn much from the activity of the early Christian Church as well as from Buddhism. We must also follow the recent Chinese moves to decentralize industry. We urgently need a variety of international and interdisciplinary cooperation in the field of comparative sociology.

My personal conclusion after fifteen years of lonely struggle against pollution is quite simple – that the power of common people is enormous and that it can be relied upon for the future. This is my hope, even amidst the enormous environmental crisis in Japan.

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# BUCHAREST CONFERENCE IN PICTURES

*(1) Welcome of participants by Metropolitan Justin of Moldavia in the Opening Service. – (2) Working Group focuses on the food crisis – (3) Prof. Shinn with the Chairman of the Conference, Prof. Parmar, and Dr. Abrecht – (4) Participants continue discussions on the streets of Bucharest – (5) Prof. Boulding and Dr. Randers speak to Dr. Mircea Malitza, Councellor to the President of the Socialist Republic of Romania – (6) Bishop Klein from the Lutheran Church in Romania addresses the Conference – (7) Participants on excursion to Curtea d'Arges – (8) Symbol of Energy, Hydroelectric Station in the Carpathian Mountains – (9) Conference in plenary session – (10) Fr. Verghese and Prof. Gilkey – (11) His Beatitude, the Patriarch Justinian, the host of the Conference – (12) Mr. de Gaspar, Brazil, and Miss Simonian, Lebanon – (13) Dr. Hardoy, Argentine, Msgr. Gremillion, U.S.A., and Fr. Spae from SODEPAX – (14) Working Group discusses technology and limits to growth, chaired by Prof. Birch, Australia – (15) Dr. Mead and Metropolitan Ilya compare their staffs.*

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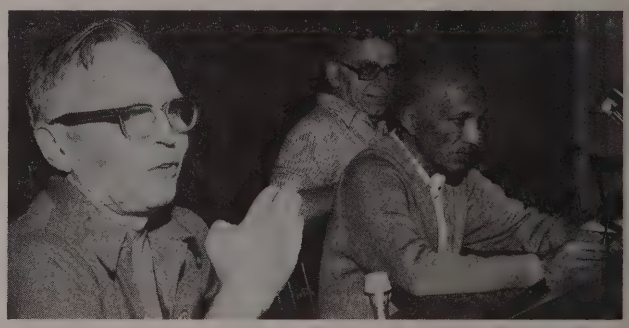

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# WORLD FOOD SCARCITY AND THE STRUGGLE FOR HUMAN SURVIVAL

*Georg Borgstrom*

Despite innumerable statistical data swirling around daily in newsmedia the poor, hungry world is so badly out of focus and our images so blurred and distorted that it constitutes almost an unreal reality. We fail to visualize both the magnitude and the nature of the misery. Few realize that we actually live in a world where poverty is the rule, relative wealth an exception and affluence belongs to a tiny minority. Our Western education, still caught in an ethnocentric straitjacket carries a great deal of the blame for this state of affairs. The prevailing notion is that we Westerners continue to lead the world in development and remain as spearheads of progress. The world on the other side of the gap – now to be counted in excess of 2700 million – is believed slowly following suite and will one day, admittedly in the distant future, share our bliss, a life of limitless leisure, boundless energy and unquenchable productivity. Almost up to 1970 did the pretentious futurologists wallow in describing this future glory of mankind. Then the bomb was dropped.

Studies appeared, giving strong evidence supporting the notion that we could not possibly continue such an overdimensioned and accelerating exploitation of capital resources. Yet "Limits to Growth" was based on a whole set of unbelievably overoptimistic assertions. Presumably mankind has to strike a balance prior to year 2000. But the entire debate centered around the affluent world, apparently oblivious of the enormous inequities. It is primarily *our* extravagence that is in jeopardy. Leading rich countries are, per year, increasing their per capita consumption of water, fuel, paper, metals, timber, etc., by far more than that of the developing world. We are doubling our resource outtakes in seven to fifteen years. The squanderers are not placed in the limelight and the rather confused debate has centered around the need for a universal limitation of growth, little recognizing all the agonizing discrepancies. While the notion of *one* world entered into the discussion, there was amazingly little perception of a world, sunk in despair and misery. Far less was there any awakening of the urgent need for something else than relief, charity, and development metaphysics. Social justice coupled with meaningful revitalization of emergency actions as the only road to survival of mankind has never left the state of pious declarations. Yet world poverty with its shadow phenomena of thirst, hunger, and abject living conditions will presumably within less than one decade force itself to the top position on the agenda of most nations of the world whether categorized as belonging to the Third World or to the two major blocs.

Despite undisputed gains the U.N. development decades have been characterized by stagnation or even retrogression. The gaps have widened as the well-to-do moved upwards still faster.

Now three UNCTAD conferences later the obvious reluctance to act contrasted brashly with the accelerated military expenditures and the huge influx of capital into multinational corporations (in the tens of billions). Following outmoded concepts a trade pattern is pursued which amounts to nothing less than a massive raiding of the untapped resources of the poor world (metal ores, fuel, timber, etc.). Only a minor percentage of investments and of aid have been directed toward the indispensable infrastructure serving education and public health. The multinationals have largely laid claims to most profitable operations, judged in short-range terms, leaving the two mentioned areas in limbo.

The most excruciating aspect of the global poverty scene is the fact that we have so completely lost control of the running of human affairs by allowing six hundred million in the short span of one decade ahead to pile up in cities. Four hundred of these millions are in the developing world which is seriously expected to invest within one brief decade in their cities more than half of what we in the affluent world have done in our entire history. This is not only the biggest migration ever, but mankind has no contingency plans whatsoever – leaving it all to prayer and providence even when the collapse is imminent. Food, water and to a great degree housing is taken for granted and it is hoped matters will take care of themselves through some mysterious automatic market forces. Even when Herculean housing programmes are implemented they fall far short of actual needs. The driving force behind this gigantic influx in the poor world is rural overpressure – yet it will not be relieved more than halfway – another 400 million will in ten years be added to that rural world. Education, training, and industrial investment are in no way keeping up with this avalanche. The number of unemployable is zooming to unmanageable proportions.

The most crucial and basic concern is the population issue with a poor world skyrocketing from two to four billion by the year 2000. In relative terms Latin America is growing the most – Mexico is now adding per year more people than the USA is, Brazil more than the Soviet Union. Asia is adding a new Japan each second year. The Philippines with its population of 42 million is adding more people than the 107 million of Japan. Forty-seven percent of this poor world is below 16 years of age, rendering a disproportionate non-productive section of society. No wonder less and less youngsters get an education, but more importantly most action programmes grossly underrate the investment needs, even when placed at an extremely modest level. On top of this comes the corresponding industrial input. More and more countries realize the key significance of stemming the human tide, but even with drastic measures to check the population growth, the food and lodging burden of the globe will double within a quarter of a century. This is the issue to which we have to address ourselves.

We have failed to grasp the nature and the magnitude of man's dilemma. We talk about aid on the order of 10-15 billion

dollars when tenfold is required as a minimum. This is said to be unrealistic, yet we in the rich world squander more than 290 billion per year on armaments and furthermore we are allowing ourselves to double this each 12th year. We stockpile bombs and missiles, far exceeding the total explosive power used in all wars – but we have not even started to address ourselves to the urgent need of granaries for stockpiling food and feed for the inevitable calamities of nature. The current drought crisis finds a world having emptied its reserves. With all our technology, and all our international agencies, we behave like spoiled children and display surprise at our troubles. Future historians will look with bewilderment on our times. After having used up in two major wars more basic resources than in all man's previous history we have made a supreme effort to put into scene one of the most wasteful and exploitive civilizations there ever was.

We continue to mobilize world resources almost to the exclusive benefit of the well-to-do. What amounts to a protein empire was built on the prevailing trade patterns, with Europe and Japan as dominant recipients. In the shape of grain, oilseeds, and oilseed meal, Europe is purchasing per year more feed protein in plant products than either Africa or India is over a whole year consuming as human food. The USSR was let in as a member of this luxury enclave last year, initiating the biggest transfer of food and feed ever taking place in history – and likewise opening the floodgates for rising prices, thereby placing these indispensable reserves beyond reach of the hungry less rich world. Despite some grain deliveries to needy countries, the protein exchange between the satisfied and the hungry world is on negative balance, both in quantity and quality. The U.K., Italy and West Germany have each been the recipient of far more grain than India. India has regained her position as topranking exporter of peanut protein, delivering of this commodity more than the African continent to the world household and its well-fed peoples. No less than half the ocean catches moves as fishmeal to the feeding troughs of the satisfied world, and this at a time when allegedly we were intensely engaged in mobilizing the oceans to feed the hungry world. Both in agriculture and fisheries, the rich world has created so capital-intensive procedures as to place their products out of reach to a world where already more than half do not earn sufficient to buy adequate food.

Switching the flow of the aquatic protein and of oilseeds from the livestock of the well-fed to the hundreds of millions hungry, malnourished and starving, is not only a prime challenge but would constitute a real contribution. This would not only remove all overt protein deficiency but provide essential protein supplementation to more than half a billion people.

One could identify four prevalent types of responses. The Marie Antoinette syndrome typifies the most common reaction to the world's current dilemma and misery. The French queen riding through seething Paris inquiring about the lengthy queues and being informed that they were waiting for bread allegedly responded, "How foolish when you can eat cake". This attitude goes far back in history, but was formulated in a particularly poignant manner by the ill-fated queen. But this notion is still very widespread if not dominant. In a well intentioned way it has even been underlying in our technical aid programmes.

The second category is typified by Voltaire's conversation with the beggar. When the beggar said, "I will always find some way to get along", Voltaire's cynical response was: "I do not see that that is necessary". Many in our midst react or at any rate think that way.

The characteristic feature of the third group is that they put on blinders. They do not want to see the world's misery or to be bothered by it. Some put on blinders inadvertently or are unaware of the fact they are wearing blinders. Our ethnocentric education carries a great deal of blame for this state of affair. More disastrous are those who through professional specialization only see a narrow sector straight in front, failing to take in the entire landscape.

A fourth category are all those that take tranquilizers of various kinds. Verbal tranquilizers are the most insidious – escaping facts and realities through evasive rhetoric or fallacious reasoning. The simplest kind point to what we – the affluent – clever, or enlightened have done referring primarily to what we in the Western World accomplished – completely oblivious or unaware of the historical, geographical, or biological framework within which we operated or unaware of the impossibility of copying or repeating our alleged feats.

Another tranquilizer conjures up earlier ghosts. "Rapid population growth is nothing new". China trebled its numbers in the 18th century, Europe more than trebled between 1850-1950. Japan increased fourfold following the 1850's. Consolation is sought in the fact that they all managed very well. Once again this reveals lacking familiarity with history, geography, and biology. All three only "succeeded" by creating major extraterritorial survival bases, partly at the cost of other nations. Some take comfort in the fact that the world has experienced population explosions and managed somehow. This is in historical terms a plain distortion of facts. Few have managed such happening without crucial disruptions. But most importantly this reasoning fails to see the magnitude as well as the unprecedented scale of our current dilemma. Besides, what we now are living through is to be sure no simple explosion – limited in time and space. It is a global happening and persistent for decades ahead. It could better be described as a population tide inexorably (unrelentingly) rising to its high level mark.

Religion appears emasculated and has forgotten its chief gospel – universal brotherhood of man. Fiction has entered into the darkest corner of the human soul and registered almost every little aberration. But it fell upon a poor Brazilian woman almost on her own to voice the plight of the destitute and the hungry. Education has fallen victim to a colossal failure. A whole generation came under the false notion that our world is an abundant one. It is the tragedy of man as formulated by Aldo Leopold to believe that the food comes from the corner store (supermarket) and the heat from the stove.

A Swedish writer in a short story depicted the old churchgoing couple, pestered by a beggar. He gets his alms and the Sunday serenity is restored. For a dime the couple not only bought non-disturbance for a cheap price – they got rid of the mendicants human predicament. This is far more eloquently described in this short story than I ever could – but does not this episode well mirror our own situation in the present world – a frightful non-engagement. We seem to put our faith in relief activities, in makeshift devices, in gadgeteering but I assure you, ambulance services although indeed commendable constitute in no way a substitute for healing and reconstruction.

We have to instill into each of our nations and into the world at large a deep sense of responsibility – going far outside of mere self-interest. The old Christian concept of man as a guardian and warden of God's riches needs to be revived and restructured. The notion of water as holy – needs to be placed into focus. The whole of nature is God's creation. Other living entities have their

right to exist and their part to play in the great symphony of living nature. Man depends for his survival on a multitude of servants, counted from livestock to lowly micro-organisms. This is not sufficient. We need to be reminded of the profound wisdom of Francis Bacon's – Man can only control Nature by obeying it.

In this light, all waste and resource destruction massive or minor are mortal sins – as they basically are directed against fellow wanderers on earth. Depriving others, or for that matter posterity, of their basis for existence is not only extravagant greediness but a capital crime. Presumably for the first time in human history has man reached complete identity between the Golden Rule and prudent political action as well as wise statesmanship. Basically no other recourse remains open.

Rethinking, as well as doing the unthinkable is called for in meeting the greatest challenge ever to face the human race. The consequences of the population explosion are so staggering that few have the courage or insight to face this grim reality of a world presently moving from a chronic hunger crisis into permanent starvation. This threatens to engulf gradually the whole of mankind even before this century comes to a close. We are furthermore burdened with a weighty backlog of myths and fallacies both with regard to ourselves and the other needy world of extreme misery, short of almost everything and particularly of basic essentials such as soils, food, feed, water, forests, etc. Completely against all facts we have been teaching about an abundant world, even though the massive slums of the earth were encroaching upon the few rich oases of Western Man.

## THE CHALLENGE OF THE SOBERING 70'S

The great challenge facing the human race is by no means the futile one of conquering space which only made us lose two precious decades. I appeal to you to join the progressive and creative forces of mankind to find usable solutions to providing the dire necessaries of man's food, water, and shelter. It is a fundamental truth that the real state of a country or a nation is mirrored in the conditions of common daily life – the conditions of man – those men that constitute the people as they are encountered in the streets; in the stores; in the factory plants; and on the farms and in the fields. The aggregate condition of these people measure the general prosperity – not the wealth of a few, whether they happen to be countries or individuals. A world where a proportionately greater number are getting hungrier, poorer and more destitute while a dwindling minority are becoming richer and richer invites global disaster. Complacency is in this context a crime; despair a vice. What the world now needs is courageous activity in the pursuit of human survival.

It would certainly reflect sadly on our civilization if we were to conquer the universe but irrevocably lose the earth. I appeal to you to make yourself acquainted with the true magnitude of the immense needs we are facing. You owe this not only to yourself, your family, to your nation but also to the world. *I assure you, the future will not be what we now are made to believe* – a computerized bliss with maximum leisure and limitless abundance. We will on the contrary be facing hard work for human survival and need to mobilize all our talent and knowledge to regain control of our human destiny – otherwise the world will slowly and irretrievably be moving down towards a least common denominator where freedom and civilization are squeezed out.

The business community, largely supported by science and technology referred to the "soaring 60's". This did not materialize. The 60's became in global terms a rather stagnant decade. Let us pray that future history may find it appropriate to describe the present decade as the "Sobering Seventies" – the period when man put an end to the rhetoric and a more solid foundation was laid for man's future. For far too long we have been accepting fallacies and subscribed to myths which early were exploded or undermined by reality itself. Such sustained delusions may well be fatal. Worse than the hunger gap is in effect the veracity gap. Only by facing reality now, grim and sordid as it may be, will we have the slightest chance of averting catastrophe. What we do or neglect to do in the next ten years will for ever determine the fate of mankind. This is what makes our situation unprecedented in human history.

Both lands and oceans have become small, when placed in relation to the oversized human race – this is paradoxically also true with regard to outer space and universe. Putting a brake to population growth and producing more food need to be exercised to the hilt, but equally important and essential to man's future is to give maximum attention to all the other dimensions of the food issues –storage, utilization, nutrition, diseases, and resources. In doing so, mankind will see many changes and experience great upheavals. The world food issue has its most potent and obvious ramifications in the area of peoples and their numbers compounded in an insane urbanization, the price of which we have failed to comprehend.

In the novel, "The Leopard", describing the collapse of the old Italian feudal society, the author, Lampedusa, allows his mouthpiece to make the thought-provoking comment: "If you do not want to change anything – everything will change". The writing is on the wall of our festive banquet. Like Belsazzar of old Babylon it is up to us to interpret and translate the meaning of the handwriting on our wall. My reading of this writing is based on thirty year's study of these matters in all continents and in painstaking research in my two professional disciplines of food science and economic geography and it goes like this:

1. The world is now irrevocably *one* – this was for decades a cliché – but it has finally become an inescapable reality.
2. We cannot expect to remain seated on the first row and see this immense tragedy unfold on the world scene – the drama of 2.7 billion people, already short of almost everything: food, water, forest resources for housing and packaging, – rapidly mounting to four billion. They certainly will not remain our providers in terms of foods and fibers.
3. I further interpret the writing on the wall to mean not a stockpiling of more bombs or indulging in continental rocketry or being dazzled by supersonic planes but in organizing the greatest and most challenging war ever to be waged by man – the grand war for human survival. We may well ask ourselves, "What can we do for the *world?"* instead of continuing the current short-sighted game, ensuing from the persistent petty query – "What can the world do for us?". In switching the focus we might well discover that we can do great things.

But with this end in mind, the affluent world certainly is well advised to put an end to its large-scale gambling and start to be more concerned about the world at large. We will then discover in addition that our own survival is at stake. We seem seriously to believe that our civilization is the first in the long line of at least 20 civilizations which we think is ordained to attain immortality. Without a supreme effort to regain control of our own destiny we may very well vanish into oblivion.

The vessel of mankind is adrift. All efforts are needed to get the motors going again and in setting a new direction – before we drift into the dangers facing us – before we are sucked down into a frightful Niagara from which few will survive.

# ETHICAL GUIDELINES AND SOCIAL OPTIONS AFTER THE LIMITS TO GROWTH DEBATE

*Samuel L. Parmar*

I. The limits to growth debate is essentially a phenomenon of developed nations. Pollution, ecological imbalance and strain on non-renewable resources represent the fall-out of "a ceaseless pursuit of affluence". They are the inevitable consequence of production and consumption patterns geared to an ever-rising standard of living. It is true that high rates of population growth, characteristic of developing countries, contribute to the burden on resources. But here again, the inordinately high per capita use of resources in rich nations is more to be blamed for the resource disequilibrium that is assuming disquieting proportions.

II. Attempts to globalize these problems are often met by indifference, even skepticism, in the Third World. This can be exasperating to ecological crusaders. But there are good reasons for such reactions. A few may be listed.

*First,* is the feeling in developing countries that the problems of the developed nations are always being projected as world problems, when their own problems and hardships are ignored. After all, the poor nations of the world have for long experienced their own brand of limits to growth. Insufficiency, deprivation and submarginal existence have been and continue to be normal facts of life for them. In a number of ways the political and economic policies of developed nations have contributed to this state of affairs. But all this has seldom been seen as a world problem. Over the last two decades much has been said about new structures of international political and economic relationships that will ensure a more equitable sharing of power and resources, but very little has been done. And now that the limits to growth discussion points out the threats to rising standards of living in developed nations, they may become so concerned with safeguarding their affluence that they would be less inclined to bother about the travails of the Third World.

*Second,* historical experience has made developing nations wary of generalizations based upon realities of the dominant nations. The latter have a tendency to convert their narrow self-interest into universalist theories. What may be projected as welfare of all, may really be welfare of the strong. One can find a good instance of this in theories of international trade and international capital flows. These theories affirm that all participants gain through the process of exchange; that trade represents mutuality and inter-dependence. The fact is that international economic relations between developed and developing countries have served as "an engine of growth" for the former and an instrument of deprivation for the latter. This is not a description only of the colonial period but holds good in our times. Let me give two instances:

- Over the last decade a number of pollution-generating industries have been moved into developing countries. It is even callously said that these countries have a comparative advantage in absorbing pollution. In the past, goods were dumped; today, pollution is dumped. Qualitatively the latter is more subversive of welfare in the Third World than was the former. One does not hear many voices calling for a global policy to regulate such actions. On the contrary, there seems to be a general approval in the name of industrialization and development of the Third World.
- More recently the October 1973 oil crisis exposed the pretensions of developed nations regarding inter-dependence. Perhaps for the first time these nations realized that they are really dependent on some countries of the Third World, and that too for a vital commodity. To put it mildly, they resented such inter-dependence, even though all theories of international exchange have paid homage to the concept.

*Third,* the root cause of environmental and ecological problems lies in the patterns of production and consumption in affluent nations. So far one sees little evidence of organized efforts to change these patterns. Countries which are struggling against poverty should not be expected to show concern for problems of prosperous nations when the latter seem disinclined to take necessary domestic action.

*Fourth,* assuming that we take successful global action to overcome ecological problems, what difference will it make to conditions in the Third World and the relations between developed and developing nations? Where is the assurance that such action will lead to radical structural changes within and between nations, that alone can eliminate exploitation of the weak by the strong and ensure a just distribution of resources and goods? Most of the remedial measures against environmental problems tend to be technological rather than structural. Developing countries are not likely to see much hope in this.

III. Developing nations are, therefore, not much exercized about the limits to growth debate. Somehow it is not yet part of their reality. But I would like to suggest that the debate is of fundamental importance for us in our quest for self-reliant development and social justice.

Generally speaking, countries of the Third World have accepted the goals and patterns of industrial countries. But these goals – of a high rate of economic growth, rising GNP, rapid increase in material standards of living, a consumerist economic system, etc. – impose a pattern of production and use of technology that have created the problems highlighted in the limits to growth discussion. If developing nations follow the economic path of the developed, they must be prepared for similar consequences. Their lot is likely to be much worse because they do not have reserves of resources, technological potential and politico-economic power that can bail them out of an ecological disaster.

Moreover, it should be recognized that the world does not have enough resources to support more than one USA. If it is the ambition of developing nations to reach the material standards of

affluent countries, they just cannot achieve it. Realism, rather than ideological considerations, require a different set of objectives and a different kind of technology for their attainment.

So far we have understood development to mean becoming like rich nations. This notion has to be discarded both because there are not enough resources to go around, and, more significantly, because it would be tragic to jump from the poverty of insufficiency into the poverty of affluence.

Consequently the limits to growth debate should prompt developing nations to discover a new understanding of development more in keeping with their realities. This becomes the most important element in the process of self-reliance.

In this context the term "liberation" acquires a special significance. It is generally used to imply freedom from political and economic domination of developed nations.

It is true that foreign capital, multi-national corporations, motivated foreign assistance, etc. contribute to the economic subservience of the Third World. But I would venture to suggest that there is a more insidious force of domination. It is the acceptance of consumerism, giantism, rapid industrialization, advanced technology and other elements of the economic system of developed nations. Unless we have a different set of economic objectives, we will never be liberated.

IV. Once we accept the view that self-reliance means a new understanding of development based upon the socio-economic realities of a developing country, there are a number of significant implications regarding production and consumption priorities, use of resources, nature of technology, and the vital question of social justice.

An important initial step in self-reliance would be to make full use of resources which are available. For most developing countries this would mean the large reservoir of unused or under-used manpower. The use of labour-using technology would follow as a corollary. Processes of production would have to be simple and not unduly dependent on imports of capital, advanced technology and experts. This would mark a departure from the pattern which a majority of developing countries seem to be following. Since development is equated with rapid industrialization, catching-up with rich nations, becoming like the developed, etc., there is an irrational imitation of their goals and processes. For instance, conventional economics considers mechanization as the first attribute of rationalization of industries. This is derived from experiences of countries which lacked adequate supplies of labour. The same step is proving disastrous (and therefore, anything but rational) for those developing countries which have an abundant and unutilized labour force. In a number of other ways imitation has blunted the innovative capacity of developing countries and enmeshed them in relationships with developed nations that only leads to subservience.

The choice of a simpler technology means an avoidance of giantism, forced industrialization and the anarchic urbanization that it breeds. It would also promote social justice by reducing centralization and the concentration of economic power in a few hands, and by making available the product of society to those who would otherwise remain unemployed. More positively, the enlarged participation of people in the production process would ensure their support and enthusiasm for it and undergird efforts for long-term growth.

Social justice requires a re-arrangement of production and consumption priorities so that the needs of the weaker sections of society are given precedence over the comforts and luxuries of the small privileged group which generally controls political and economic power – of course in the name of the people! Amongst other things it would mean divesting the dominant few of their power by political means. Without that it would not be possible to change the institutions that generate injustice and exploitation. Instead of considering all increases in GNP to signify development, as we tend to do, it is now necessary to introduce a qualitative yardstick. What are the goods and services whose production is increasing? If these cater to basic needs of the people then the increase in GNP is co-equal with development. If, however, these are only for the privileged few, the resultant increase in GNP is subversive of development.

Let me exemplify from the Indian situation. If after over two decades of planning less than 10% of villages have drinking water, more than 40% of the population is below the poverty line, the number of beggars and destitutes increases faster than the rate of growth of population, there are more unemployed people both unskilled and educated, the gap between the rich and the poor has widened, – where is the virtue in the fairly impressive increase in GNP and per-capita income which India has achieved? Consequent upon these shocking manifestations there is now a realization that our social and economic policies need to be radically revised, with greater emphasis on social justice and self-reliance.

One more aspect of social justice deserves serious consideration. There is general agreement that a need-based minimum should be assured to everyone. This can be quantified in terms of calories of food, meters of clothing, square yards of housing space, health and educational facilities, etc. Thereafter, the quantum of resources necessary to ensure this minimum can be estimated. But, as mentioned earlier, developing economies have their own brand of limits to growth, expressed in their poverty and insufficiency of resources. Once priority is given to the attainment of a desirable minimum a major portion of these resources will be needed for that. Consequently, society will have to impose a permissible maximum on consumption, possible on incomes. Experience in many countries of the Third World shows that this cannot be done without a radical change in the structures; in power and property relations. The moment a maximum is suggested, the existing power structure feels threatened and resists it by all possible means. But let us be quite clear that if affirmations of social justice are to progress beyond slogans and sentimentality, a restructuring of society is unavoidable.

In the wake of the limits to growth debate it has been suggested that developed nations should tame their consumerism and reduce their rates of growth, so that they would not usurp the bulk of the world's resources, thereby leaving a little more for developing nations. The spirit of this suggestion is in line with the concept of a permissible maximum and also subscribes to international economic justice. Here again, good intentions alone will be of no avail. Major changes are called for in the internal socio-economic structures of developed nations and in the structures of the international economy.

The thrust of arguments in this section is three-fold. *One,* that developing countries must discover their own path to development, and emancipate themselves from the stranglehold of values, ideas and policies acquired from affluent countries. *Two,* that this is not possible without a new ethos and structural changes based thereon. *Three,* that international relations need to be altered accordingly.

V. Ethical guidelines should help us to distinguish between

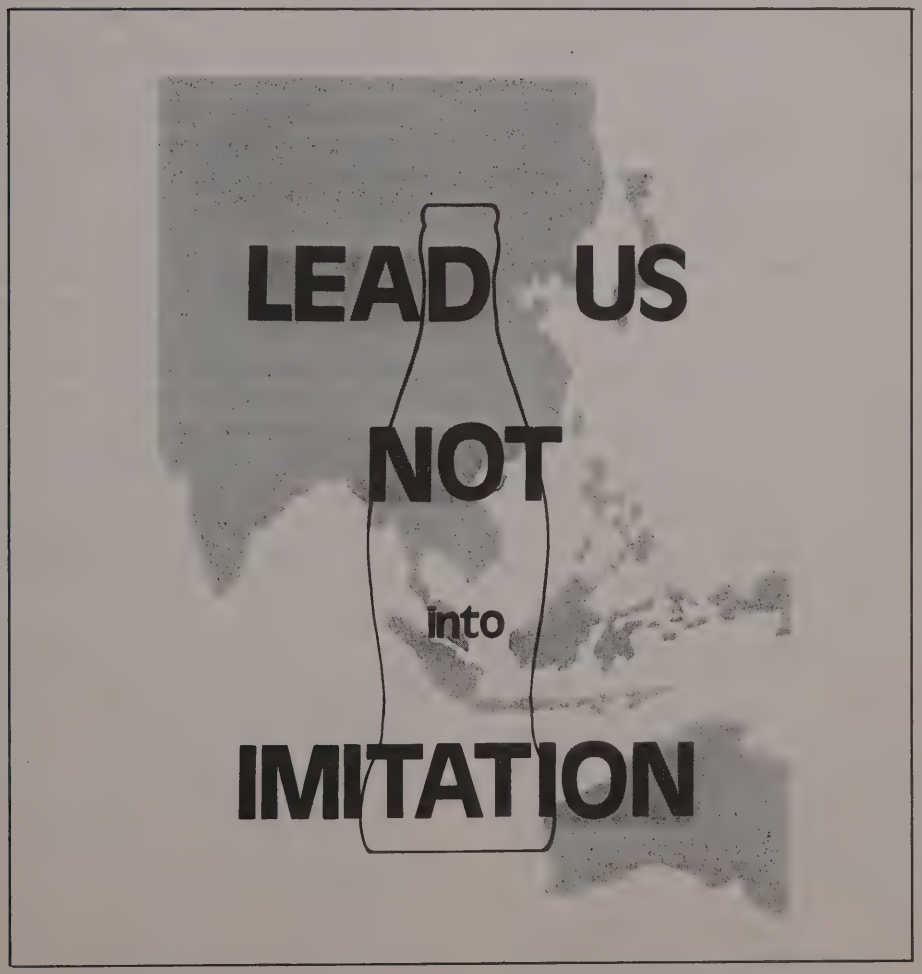
right and wrong, or use and abuse of resources, in a given situation. One regrets to admit that the "ethics" that governs much of socio-economic action today gives priority to goods over people, to quantity over quality. It is considered an efficient use of resources to replace men by machines, to produce goods and services which bring greater profit rather than those which meet basic human needs, to deplete non-renewable resources to meet the insatiable needs of industry and modern technology, and so on. Thus efficiency, profitability, increased production, etc. become the measure of what is or is not desirable. It is easily assumed that these will contribute to human well-being. But do they?

If we want development with a human face, its subject should be people not things. The sub-title of Prof. Schumacher's book "Small is Beautiful" is "A study of economics as if people mattered". I could hardly do better than to commend it as the basis of the new social ethos and ethical guidelines that we need.

Let me end on a parochial note – a word to people from the Third World. Most of our countries have opted for the values and ways of industrial nations. Our experience over the past two decades shows that these have not solved our problems, but may even have aggravated them. We must recognize that in a relative sense, that is, in comparison to developed nations, and in terms of the prevailing economic yardsticks we will continue to be poor. Should we not develop a different yardstick of measuring progress? The quest for self-reliance is much more than an economic concern. It is an attempt to find dignity and meaning within the material limitations which will remain. The limits to growth experienced by developed nations are likely to increase our burdens as these nations strive to ensure their material standards.

Our concern for social justice should engage us in efforts to remove corruption, exploitation and inequality within our own societies. Only then will we have the credentials to advocate international justice, a global sharing of political and economic power, and an end to the domination-dependance relationship which characterizes relations between developed and developing nations.

Whether it is internal or international change it cannot be brought about by resources or technology. It requires structural changes. Looking at the trends in countries of the Third World one wonders whether we are at all aware of the perils that our predilection for Western ways has brought on us. Maybe the growing dissatisfaction with our performance so far will lead us in more authentic and creative socio-economic directions. In a climate of growing pessimism, that is our only hope.




(From the Report of a EACC Christian Youth Conference in Hongkong, July 1970)

# TECHNOLOGICAL DEVELOPMENT AND THE FUTURE OF MAN IN A SOCIALIST SOCIETY

*Mircea Malitza*

In Romania we have attached considerable importance to technology for human purposes. However our discussion of this topic has not undergone the dramatic fluctuations experienced in other parts of the world. Twenty five years ago, there was a confident attitude to the power of technology to shape the world anew. Deserts would readily be made fertile; rivers would be tamed and made navigable, plans were drawn up for important man-made geographical mutations – everything seemed within our reach.

Today, the literature is at antipode. A considerable number of articles blame technology for its dehumanizing effect, for the deterioration of nature, the exhaustion of resources and even for the acceleration of an irreversible ecological calamity. Were they endowed with the power of speech, machines could, in the face of such a radical change of attitude, recite the classic line of Racine[1] that they "deserve neither this excess of glory nor the one of deprecation".

Within the materialistic-dialectical concept of societal change, technology, obviously, assumes an essential role. It has been placed in the domain of *productive forces* making possible the production capacity necessary for the development of economies and human wellbeing. But, however characteristic for the progress of a society may be the role of productive forces, its development is actually determined by the nature of *production relations,* reflecting the nature of ownership over productive forces, and of the relations between people as they use such forces.

It seems to me that the contemporary debate substitutes, to a considerable extent, problems pertaining to the field of productive forces, for matters inherent to productive relations, involving the difficulties, barriers and contradictions of the system itself. That is why machines and technology are indicted for many evils which they did not cause but rather simply reflect. Negative notions are now making headlines such as "counter-technology".[2]

There is no such thing as a machinery working without being run, supervised or at least programmed by man. There is no evil in technology as such. Technology means an increase in the powers of man, for good or for bad. It is an amplification of man's capacity to intervene in nature in order to subdue it, to enclose it into the laws of geometry, to convert it for useful production and purposes. Thanks to advanced technologies we have today food, clothing, good housing, extended communications, free access to culture and classic music to a degree that could not be dreamt of by Mozart, or, more recently, by Enescu.[3] But technology can also mean unprecedented destruction, the capability of materially and spiritually polluting mankind, of disseminating cheap values which emphasize sensationalism, vulgarity and violence.

That is why technology, in the last analysis, is the problem of man. The main subject of any proposition that includes technology continues to be *Man,* who creates, realizes and uses it.

Before elaborating on these ideas in the light of the recent dynamic world-wide debate, I would like to make a brief exposé on our own experience in socialist Romania.

Our people have an old propensity for technique. You might think that grazing and farming, which were predominant for centuries in Romania, carried them away from technology. But our people's great sense for nature, is not at all inconsistent with sharp inventiveness and a liking for technical creation and innovation. In the Technical Museum of München there is an old Transylvanian peasant water-mill, the blades of which, created by the genius of the people, represent an advanced hydrodynamic form for obtaining highest efficiency. Aviation was still in its cradle when the Romanian inventor *Aurel Vlaicu* asserted himself as one of the pioneers of flying, as designer of his own planes. Who has not heard of Constantinescu, the discoverer of sonicity, or of Coanda, the learned man whose name is closely linked with jet-flight? In my opinion, there are not two different types of intelligence, one agrarian, patriarchal, and the other bent on technics. One and the same aptitude of man to create and to continually adjust to changing conditions constitutes the core of intelligence. However, when it comes to culture we can certainly speak of different types. There is a philosophical-literary type which is inappropriately called humanities, and another culture bearing a technical-scientific imprint. The separation between them that appeared in contemporary civilization has been much discussed beginning with the famous speech by C.P. Snow.

In its modern form, technology appeared somehow late or isolated in our country. The first railway, linking Bucharest to Giurgiu, was built in the 1860's and, about the same time, oil drilling was started, which makes us one of the oldest oil producing

[1] Racine (Britannicus, 1669): "Je n'ai mérité ni cet excès d'honneur ni cette indignité".

[2] Robin Clarke, "L'urgente nécessité d'une contre-technologie", Impact XXIII, 4, 1973.

[3] If for highly developed countries technology means *high achievements,* for some developing countries it often means *survival.* In this connection John McHale offers a telling example. For the American community and maybe for many others, moon landing was the greatest technological achievement of our times. But for a billion people for whom rice is the basic food the selection of the IR 8 species of rice and its widespread cultivation in Asia was a much more important achievement to the extent that it succeded in filling hundreds of millions of rice bowls that had earlier been only half full. That is how for those who know hunger as a familiar way of life, technology is the most appropriate means to offer them the reward they are expecting. (See John McHale, "World Facts and Trends" in "Futures", 3, 1971, pp. 216-301).

countries in the world. The presence of one industry alone did not alter the social and economic landscape of our country and Romania remained for a long time agrarian, exporter of raw materials with a very small processing industry. I think I do not need to remind you of the great discrepancies which existed in the Romanian society torn by exploitation, inequality and injustice. At the same time our country was only a pawn on the international chessboard which did not enjoy real independence because of the external allegiance and interference in our domestic affairs by both foreign governments and international companies.

The advent of socialism has, from the first moment, set as the goal, to remove our lagging behind and to accomplish a historical mission in which the preceding ruling classes had failed. Romania's emergence in the world with a status of dignity, equality, and independence is indissolubly linked to the creation of a powerful economy, of a material stronghold which should ensure a high standard of living and make Romania a sound partner in economic and commercial exchanges within the framework of international division of labour.

Romania is among the few countries in the world which have maintained over a period of more than 10 years a growth rate of over 10% in the field of industrial production. As against the prewar figures, by the end of the current five-year plan in 1975 steel will be 33-34 times higher (10 million tons), the machine building 92-98 times, and the chemical industry as much as 200 times. Yearly cement output is over 10 million tons and electric power is approaching 50 billions kwh. Industrialization has become the keyword of the development programmes and plans of this country.

This orientation is set forth with particular clarity by President Nicolae Ceausescu: "Sustained industrialization, at the level of the requirements of the contemporary technical-scientific revolution, is one of the main characteristics of the process of radical change which Romanian society is undergoing today. Life shows that the successes we achieve in the development of our industry, in providing for its technical equipment, in the betterment of its organisation and the heightening of its economic efficiency, are to a great extent decisive for the growth of our material wealth, the dynamization of our entire social activity, the raising of the living standards of our people, the enhancing of Romania's international cooperation, the strengthening of her independence and sovereignty".

Under these circumstances it is only natural that we give great confidence and large support to technology. The process of renewal and modernization of production, the introduction of high technical performance machinery, equipment and plant, the inclusion of new production lines, the diversification of consumers' goods output, the introduction and extension of modern technological processes. the improvement in mechanization and automation, the increase in the work-load index of machinery, are as many topics of the yearly reports on the fulfillment of our economic and social development plans.

The official statement for 1973 lists for example the introduction of the 1000 tons per hour steam boiler operated on brown coal, a cement line with a capacity of 3000 tons per 24 hours and the 25-28 ton tip-up trucks. There is no doubt in anybody's mind that machinery is the indispensable condition for increasing labour productivity, for improving the standard of living. An example in this connection is the development of housing. Last year the Government commissioned some 100.000 flats, apart from the 50.000 funded by their future owners. Such a result could never have been achieved without a building materials industry which was enhanced last year by new glazed tiles plants, cellular expanded steam concrete works, prefabricated elements, binding materials and asbocement plates factories and new cement production lines. Today, on the building sites of Bucharest one can see the 125 ton cranes of Romanian make with a lifting capacity of up to 150 m.

I would like now to underscore a few of the elements which we can draw from the experience of our country in the field of new technology and the building up of a powerful economy based on industry. *Training of people comes first.* Machinery requires trained generations of knowledgeable technical people. The structure of our educational system was in the past, as in many developing countries, directed towards general training focused on humanities with a poor scientific and technical basis. Man lives today in a world where technology permeates our daily existance. I think that it is precisely the lack of understanding of the "modus operandi" of all these mechanisms actuated by push-buttons, the ignorance of the underlying physical, chemical and mechanical phenomena that is almost certain to be a source of alienation.

Technical training is in many countries at much too low a level as compared with other subjects which steal the limelight. That was why education in Romania set the goal of training skillful people capable of dissembling an appliance or a mechanical device, examining and assembling it anew, that is, providing the background of scientific knowledge necessary for understanding both nature and technology. The basic aim of education today should be – in our view – to give the young people the knowledge and the ability to live and to live well – in a kind of world they are likely to expect – a world of technology.

In this sense, the figures showing the present structure of our high school and academic training are quite significant. Since 1966 specialized high schools were created, with compulsory ten-grade general education, pursue more advanced production-oriented activities. The development of such specialized secondary schools is correlated with the targets of the economic plans and with the forecasts on gainful employment.

Among these, industrial secondary schools accounted, in the 1972/73 training year for 47,4% of the total number of pupils registered for specialized schools, whilst agricultural schools accounted, over the same period, for 18.4%.[4] As a second consideration, no country can develop solely through importing technology or by acquiring patents. A creative attitude towards machinery, continual efforts for its betterment, a spirit of permanent innovation for improved technology are the indispensable prerequisites of development. This implies a need for a valid *national scientific and technological structure.*

Near Bucharest, on the very site where a romanticist poet – otherwise very popular with us – deplored a hundred years ago the building of a railway, a nuclear physics institute is now in operation dealing with the most up-to-date topics. Romania was

[4] Following the upward trend of our national economy and the continual modernization of the technologies used in industry, vocational training also shows a considerable development; the number of vocational schools was in 1972/73 as high as 717 with 371.757 pupils in attendance as compared with 224 vocational schools attended by only 39.250 pupils in 1938/39. At the same time, post-graduate education and refresher courses place their emphasis on up-to-date training in such activities as are daily deployed in clinics, laboratories, pilot and experimental stations and on developing specialists in the fields of medicine, informatics, computer programming, radio-isotopes use or non-dissembling trouble shooting. Within the frame-work of international scientific and technological cooperation, Romania has for several years initiated UNESCO postgraduate courses in the fields of oil and petrochemical industry and mathematical modelling.

among the first countries in the world to engage in nuclear research and applications.[5]

The third element I would like to underscore in connection with technology in our country and its future, is the *prospective vision,* the systemic approach characteristic of our development policies.

Some authors deplore the fact that contemporary thought suffers from excessive fragmentation. We are – they say – the products of specialized culture. We all have the nostalgia of synthesis and the ever unfulfilled craving for a global and comprehensive outlook. The economic development of Romania is pursued not as an aim in itself but in close relation with a social finality. Economic and social aspects of development are never separated. The guide-lines of the future development of our country are discussed by a body called "The Supreme Council for Economic and Social Development", comprising persons from different walks of life, chaired by the President of the Republic.

It is a sort of parliament for long-term policies and as such, this type of institution has aroused vivid interest especially in the developing countries. At the inaugural meeting, a year ago, President Nicolae Ceausescu has emphasized the necessity of placing man in the centre of all our preoccupations and defined guiding principles for the elaboration of policy projections. I would like to quote only one excerpt which shows how the policy of industrialization is implemented in this country: "We must learn to adequately combine the considerations of economy and efficiency with those of a social nature, which we have to permanently bear in mind when establishing the allocation of productive forces in our territory. It might, of course, be possible that at a given moment some economic calculations should demonstrate that it would be better to build some industrial unit or another in an already existent centre. But, if we take into account labour and the need to ensure that the population remains in the relative areas and districts, we will find that we must sometimes give priority to social considerations".

I hope that now our attitude towards technology and the stand we take on this very significant issue will be better understood.

We think that technology can become tainted not only by the fact that it is sometimes used for destructive goals, but also by the objectives imposed artificially on them by the mere logic of profit. There is nowadays a lively debate going on as to the essence of genuine human needs. Such needs may sometimes be real and justified as are those for plentiful and adequate food and clothing, for access to the sources of culture and accurate information, for better homes, for unlimited development of human values without prejudice to others, for clean water and air, the need for a decent life. Those are indeed real needs. But today, in the industrially advanced countries, the individual consumes in a lifetime 500 times as much resources as the one in the poorly developed countries. Recently, the idea of defining human needs was introduced in connection with the debate on the limits of our planet's resources. The race for irrelevant quantity launched by the consumer society seems to bring about a distortion of the real and legitimate needs of man. There is a threshold beyond which surplus affluence appears to be the enemy of man's happiness. And to use another French saying "Trop d'abondance appauvrit la matière". Excess and prodigality cannot be made but at the expense of shortage and want for others. One can hardly fail to see that there is today an increasingly strong movement for social equity, justice and for equality. It is apparent within the national boundaries, but also on the international level. A fair distribution of wealth is a keyword which dominates United Nations debates, and it echos the political programmes of various countries.

We live at a time of a huge process of change and its rate is getting faster. Old myths are toppling and erroneous avenues are blocked. There is just one thing that is inexhaustible and that is the *capacity of man to learn and to adjust.* That is the one thing which is overlooked in Meadows' book "The limits to growth". Development is actually a learning process, one of assimilation and creation. To live with technology, we must learn to master it. Without it life is much poorer and less rewarding. We must not underrate mankind's capacity to walk fast when it is unburdened of the social hurdles and limits that prevent the access of people to culture, science and progress.

[5] Scientific research and technological development activities are organized by the National Council for Science and Technology in harmony with the general plans for the economic and social development of our country. Prospectives studies concerning science and technology over periods of 15-20 years and beyond, have been undertaken especially in the domains of physics, biology, electronics, data processing, power, agriculture, food, transport, telecommunications and environment protection. These theoretical and applied research activities have a strong starting basis in the traditions of the Romanian schools of mathematics, physics and chemistry whose results gained world-wide recognition also in the past. The socialist regime gave a new impetus to these research activities focusing them mainly on the contemporary development process and establishing close inter-relation between education, research and production.

# ECOLOGY OF DESTRUCTION

*Warwick Estevam Kerr*

Allow me to present you with some of the problems of destruction of nature that are occurring in my part of the world. I must mention from the outset that the Brazilians are not the only ones responsible; I will go further and say that the great majority of the Brazilians are not responsible at all for the systematic destruction of our ecosystem. It is due to a combination of factors arising from the developed and developing world which I call ecology of destruction. Brazil is suffering from the same major problems of conservation which the majority of countries are faced with today. I want to concern myself here with four aspects of conservation of natural resources – or the lack of it – that Brazil faces: the destruction of forests, changes in the ecosystem caused by the construction of roads, the indiscriminate use of insecticides, and the manifold consequences of industrial pollution.

**a) Destruction of forests.**

In Brazil, we have five major types of forest: Amazonic Rain Forest, Atlantic Forest, Campos Cerrados, Caatinga and Auracaria (Ab. Saber, 1970) and all of them are being destroyed. In 1952, at a meeting of the Brazilian Association for the Advancement of Science, Prof. E. Maack, a geologist, stated that if the present rate of forest destruction goes on, in about 50 years there will be no more Atlantic forest in the "terra roxa" of the state of Paraná (very likely the forest with trees of the greatest average height in the world). His remarks were greeted with derisive laughter. For his audience such a statement seemed quite crazy. In fact, it was an underestimate! Six years later, Prof. Maack in another meeting asked permission to reconsider his statement, since the monthly rate of destruction had increased considerably. Now, in 1974, it is about six years since the last northern Paraná forest of high trees has been cut down and superceded by coffee and other agricultural products. Nowadays only small woods of private farms remain and even these are gradually disappearing.

A survey by I.B.D.F. (Brazilian Institute for Forest Development) of Nov. 1974 revealed that the Amazonian region had lost 24% of its forests. Such forest covered 3.574.000 km² of the Amazonic area, but now this has been reduced to 2.731.000, that is 843.000 km² have been eliminated; most of the area is being transformed in pastures. Consumption of wood in Brazil reached the figure of 158 million square meters, of which 78% was burnt as fuel.

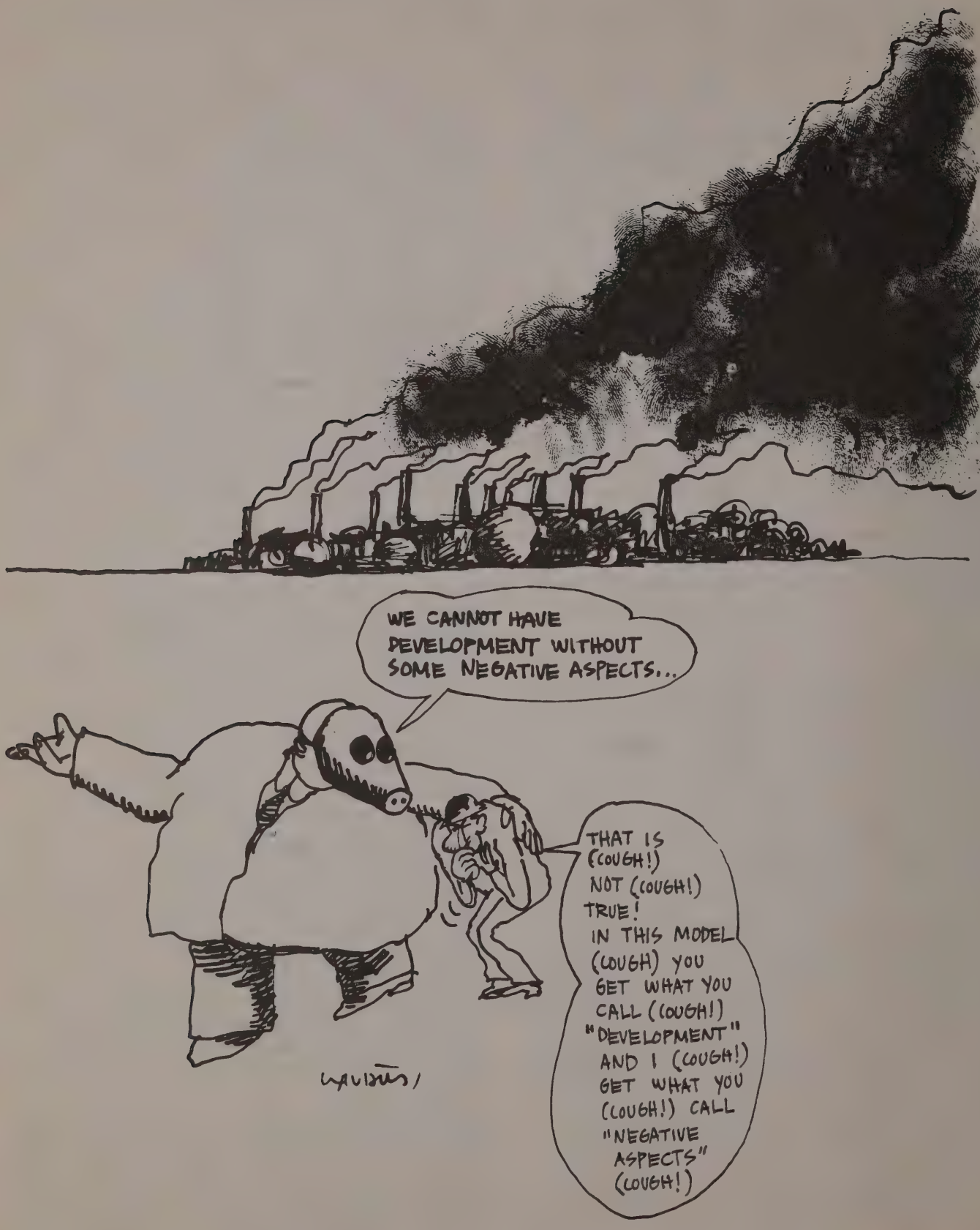
The Brazilian program of reforestation is economically very important, and in the next three years it will diminish the destruction of the virgin forests. However, at the present time it is having dramatic consequences for our flora and fauna, because this reforestation has, from an ecological view-point, two basic defects. In Brazil, the reforesting companies are permitted first to chop down a native forest and secondly to substitute for it *Eucalyptus* or *Pinus* species, that are exotic plants, not belonging to any Brazilian ecosystem. Around my town in the last four years 10.000 km² were cut and substituted with these two foreign species. As a result the flora and fauna of those areas were reduced nearly to zero in the first month but later on there was an invasion of insects that can live in the secondary layer of the *Eucalyptus* forest. However, in the *Pinus* forest not even this happens.

Hundreds of private companies have arisen and are promoting this type of "reforestation". One of the most powerful is planting 12 million *Eucalyptus* trees per year, whereas the estimated rate of destruction in the whole of Brazil is 25 times this figure. There is therefore no indication that the rate of destruction will be attenuated. Europeans, North Americans and now Japanese like to eat beef and can afford it. Beef prices have increased by more than 100% in the international market. Underdeveloped nations must provide the beef. In order to satisfy this demand, enormous amounts of tropical forest, of many species, are being destroyed and planted with grass to feed cattle. A few months ago the Skylab produced data that revealed enormous fires started by companies and farmers in the Amazonian forest that destroyed 1200 km² in two or three days.

As a direct consequence of similar destruction, the north eastern states now have 2.5% of their territories covered by forest; the great central state of Minas Gerais has only 10%, whereas the ideal figure suggested is around 30%.

Yet, it is known that cattle is not the best transformer of vegetable to animal protein. For each kilo of cattle protein eight kilos of plant protein are necessary, while for chickens the conversion ration is 2.2 and for fish it is still less. In addition, the growth efficiency of rodents is such that they can produce four times more meat than cattle.

There are further consequences of this ecological destruction. Water retention is diminished and earth erosion increases at such a level that many rivers have become silted, their depth is diminished and consequently great flooding occurs. So great is this erosion process that it is affecting even our great rivers. In the last 20 years two new fluvial islands were formed in the Paraná river in the South of Brazil, near Guaira, through land transported by other rivers. The distribution of rainfall is also changing. Salati and others are studying isotope (180 and Deuterium) concentration in the Amazonic basin and correlating it with rain-


WE CANNOT HAVE DEVELOPMENT WITHOUT SOME NEGATIVE ASPECTS...
THAT IS (COUGH!) NOT (COUGH!) TRUE! IN THIS MODEL (COUGH) YOU GET WHAT YOU CALL (COUGH!) "DEVELOPMENT" AND I (COUGH!) GET WHAT YOU (COUGH!) CALL "NEGATIVE ASPECTS" (COUGH!)

fall, geographical region, and season (Salati et al., 1973). So far these studies have revealed that areas covered with trees not more than 60 km distant, when compared with areas covered with grass, have a very distinct distribution of rainfall over the year. According to Salati the evaporation produced by trees is greater than that produced by grasses and this greater evaporation is one of the factors responsible for greater and more regular rainfall. In this context it should be mentioned that the major agricultural problem of the so-called drought area of Brazil is not lack of rainfall but irregularity.

**b) Construction of roads.**

Castro (1974) reported on various studies on the floods of 1974 and of other years, and found a yearly correspondence between the severity of floods and construction of roads in the state of Maranhão (North Brazil). This can be explained by two ecological disturbances – first, paved roads allow such a high and quick evaporation that this modifies the climate of the areas that they pass through, and second, the roads allow a quick exploitation of the forests adjacent to them. The consequences were erosion and silting of the Macapa and Mearim rivers. Until 1960 variations in temperature in those areas oscillated between 24 and 30°C; after the construction of the roads the minimum is 20 and the maximum is 40°C.

The most controversial road is the Trans-Amazonic. Scientists warned that there was a lack of scientific knowledge with regard to populating that area. Now a study of the present Ministry of the Interior has revealed that in this area there has been a sharp increase in crime, prostitution and a decrease in health. Besides these social problems, the road has been a large scale source of forest destruction. However, there was a serious political problem – if the Brazilians had not occupied this area, many overpopulated or eager-for-ore countries might have begun to have ideas!

**c) Indiscriminate use of insecticides, fungicides and defoliants.**

The advanced nations have prohibited the use of DDT in their territories because of its disastrous after-effects. But, ask the industrialists of advanced nations – what should we do with the factories and the stock of DDT we have? The answer is as clear as unpolluted water: sell it to the underdeveloped countries. The edition of the "O Estado de São Paulo", a Brazilian newspaper, dated 17 May 1974, reported that 6 persons had died, 428 were poisoned seriously enough to warrant admission to hospital, 224 admitted to private clinics; 1895 animals died (1549 cattle, 121 sheep, 225 pigs) as a result of the application of DDT spray during one season in soyabean plantations in the state of Rio Grande do Sul, in Southern Brazil. A later official report discovered that these numbers were gross underestimations: the number of people killed by 5 million kilos of all types of insecticides (mainly DDT and BHC) in Rio Grande do Sul was 200 in that agricultural year (1973-1974). Also the official report says, without giving precise figures, that fish in ponds, creeks and rivers were badly poisoned.

This does not even take into consideration the permanence of many insecticides in the soil (37% of DDT applied still remains in the soil after 17 years, and 40% of Aldrin after 14 years). But genetics also play their tricks. Pests acquire resistance to the insecticides. Originally an aphid, which is a plague of cotton, was efficiently controlled by a concentration of 30 grammes of parathion per 100 liters. Seven years after, the lethal dosage had increased 5 times. In Central America, the progressive increase of resistance in cotton insects to insecticides necessitated a corresponding increase in dosage. At the present time 30 times the old controlling dosage is required.

Firms that are under control in developed countries go wild in the underdeveloped. The amount of Bayer mercurials (Neantina) that are sold as fungicides in Brazil has caused kidney injury in thousands of people through the consumption of tomato, eggplants, strawberries, cucumbers, etc. At this moment we are facing a new problem. Chemical factories have an enormous excess of the defoliant "agent orange", containing Dioxin, not used by the USA since the US army left Vietnam. Of course it is being sold to the underdeveloped countries; later on we may be blamed for destroying many species by the use of this defoliant.

In addition to these systematic causes of ecological destruction, we still have uncontrolled hunting and ecological imbalances. The indiscriminate application of insecticides, extensive hunting of toads, forest destruction, all the elimination of natural enemies, have been cited as being responsible for the plague of locusts in Minas Gerais State (Central Brazil) in 1973.

**d) Industrial pollution.**

I will not mention here the direct harm industrial pollution does to man – this has already been documented elsewhere. I merely want to emphasize the destruction of many species called not long ago "renewable resources". But of course, we must remember that, when the last member of a species is destroyed, we no longer have "renewable resources".

Our rivers are dying. Last May there was an enormous mortality of fish in the Paraiba valley (S. Paulo state). These fish contained up to 5.9 microgrammes of zinc per gramme of tissue!

The damage caused by one of the factories of the German firm Mannesmann in Belo-Horizonte is just unbelievable – all the houses in a radius of 500 meters around the factory are yellow due to the pollution from its chimneys. The Norwegian factory Borregaard would probably not be allowed to pollute in Oslo as it does in Porto Alegre.

## SOLUTIONS TO BE CONSIDERED

There is no general solution and no easy way to conserve what is still left. Also, each country has to reach a medium term compromise between development and conservation. However, some small suggestions can be made:

a) Natural parks. In tropical areas, with a variable environment, a few large parks are less effective than many small ones spread all over the country, which would represent as many different ecological niches as possible.

b) Reforestation, not only with *Eucalyptus* and *Pinus*, but with many more local species of plants, so that, apart from the advantage of lumber and pulp, the local fauna can survive.

c) Education: ecology (especially conservation) and biology should be taught from primary schools to the last years of University in all courses, especially for engineers, architects and agronomists. A programme of education could also be used all round the world to attempt to diversify human feeding habits, so that rodents and many species of birds could be bred and used as food.

d) Research on biological control of epidemics. This is a field that can provide control of a given pest without damaging the whole environment.

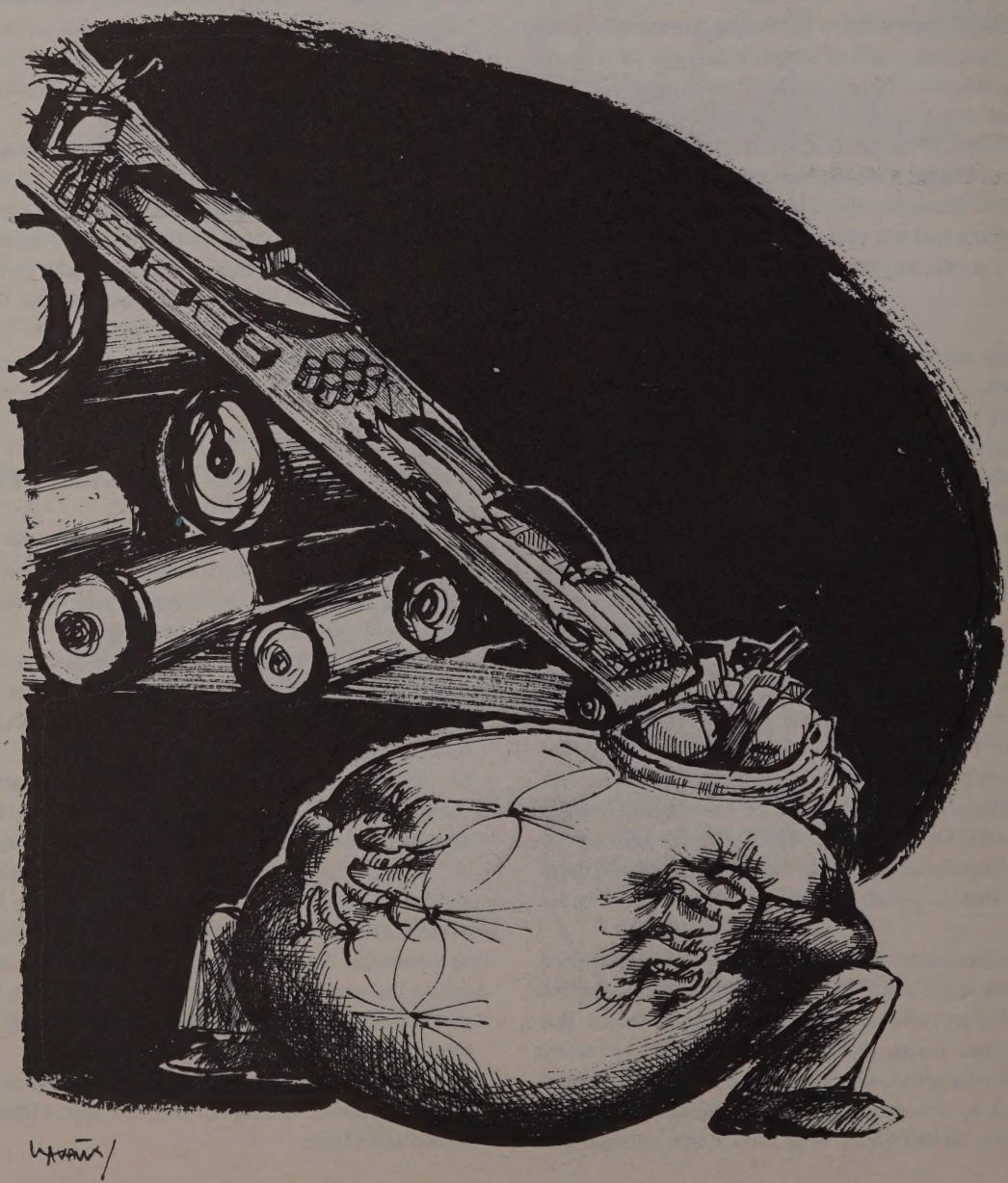
e) Incentives in towns all over the world to use trees from local forests as street plants, in the city parks and at the edge of roads. Birds, reptiles, insects and mammals all form an interlaced ecosystem based on local flora. The cities could therefore have more natural life if they maintained some of the local flora. Unhappily the underdeveloped countries do not always use the local flora as ornamental plants.

f) Zoos – these should be used as reserves of rare animals, or animals in danger of extinction. Creation of incentives for local zoos where such studies on wild animal breeding could more easily be done. All the zoos in the world should try to breed all their species in captivity and should therefore have smaller numbers of animals and greater numbers of individuals of each species. Grants should be given for the study of the reproduction of such species. In this connection, grants for facilities and equipment should be given to laboratories that would study, breed and maintain species about to be destroyed.

g) Foundations and societies concerned with conservation. – 1) Each foundation should buy natural woods and forests, particularly in areas situated between parallels 30°S and 30°N where 90% of the species are. When possible and desirable, such forests should be made available to universities with the understanding that the area should be a reserve park and no economic utilization should be carried out there before the year 2174. At the present prices for forests, I believe that cooperation among many foundations would make it possible to buy 15.000 to 30.000 hectares of natural forests per year. In this way enormous amounts of areas that are being rapidly destroyed could still be saved. 2) Grants should be given to countries, states, counties, private or public organizations in order to maintain botanical and zoological gardens emphasizing the local flora and fauna. 3) Grants should be given to hundreds of laboratories that are willing to study conservation of seeds, of pollen and of sperm. Collections of seeds of all trees and herbs should be started as soon as methods for doing this are discovered.

h) Careful collection of species. Many scientists are themselves becoming major predators when collecting animals. In Brazil, one person alone collected 100.000 cerambicidae (a type of beetle) in the Serra do Cipo (Central Brazil). Another scientist collected a few dozen of a certain type of frog and effectively eliminated the species in the area.

i) Development of other sources of energy, especially to avoid the use of trees.



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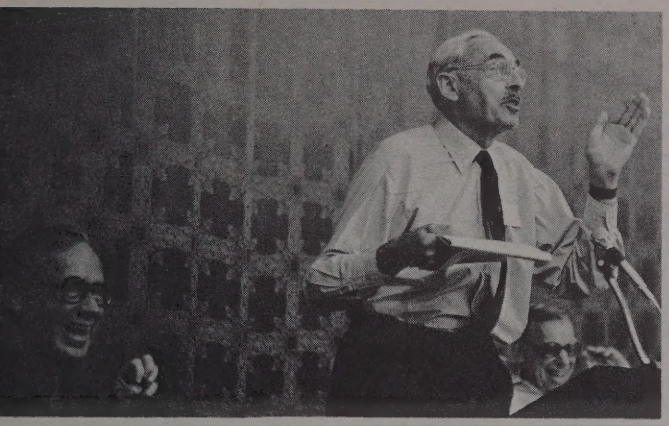

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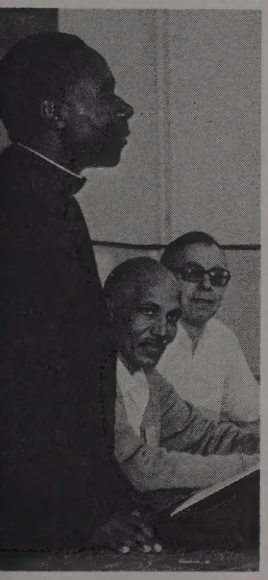
Bucharest was the scene of recent Church and Society consultation to finalise a five-year study on the future of humanity in a world of science-based technology. (1502) Opening worship service in the Cathedral of Romanian Orthodox Patriarchate. (1503) Dr. Magnus Pyke, secretary of British Association for the Advancement of Science, addressing 130 technologists, scientists and theologians at consultation. (1504) Dr. E. Mveng, S.J., professor of history, University of Cameroun. (1505) Dr. Mircea Malitza (left), Minister and counsellor to the President of Romania, with WCC's Church and Society Director Paul Abrecht and Metropolitan Justin of Moldavia. (1506) Lutheran theologian Keith Bridston of USA (left) and Dutch economist Harry de Lange. (1507) South Korean urban planner Gregory Pai compares notes with Uruguay's Miguel-Angel Brun. (1508) Dr. Margaret Mead (USA), Dr. Ben Nwosu (Nigeria), Dr. W.A. Visser 't Hooft, honorary WCC president, Miss Shyamala Balasubramanian (India), Msgr. Charles Moeller (Vatican).



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